

A STUDY OF THE SPECIES OF THE GENUS *DICHOPETALA* (ORTHOPTERA:
TETTIGONIIDÆ).

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The possession of the extensive series of this genus secured by us in the southwestern United States in the summers of 1910 and 1912, with the acquisition by the junior author of the very important representation of the same group contained in the Bruner Collection, prompted us to make a detailed study of this interesting but previously little-known genus of long-horned grasshoppers. The scope of our work became so extended that practically all the material of the genus in American collections was finally examined. The few types contained in European collections were relatively unimportant. Our work has required the description of a number of new forms and the synonymizing of several old ones.

The color descriptions have been based on Ridgway's recent set of color standards.¹

DICHOPETALA Brunner.

1878. *Dichopetala* Brunner, Monogr. der Phaneropt., p. 77.
 1891. *Dichopetala* Brunner, Verhandl. K.-K. Zool.-bot. Gesell., Wien, XLI, p. 4.
 1897. *Dichopetala* Saussure and Pietet, Biol. Cent.-Amer., Orth., I, p. 315.
 1900. *Dichopetala* Scudder, Proc. Davenport Acad. Nat. Sci., VIII, p. 67.
 1900. *Dichopetala* Rehn, Trans. Amer. Entom. Soc., XXVII, p. 88.
 1901. *Dichopetala* Rehn, Entom. News, XII, p. 207.
 1902. *Dichopetala* Rehn, Trans. Amer. Entom. Soc., XXVII, p. 335.
 1902. *Dichopetala* Scudder and Cockerell, Proc. Davenport Acad. Sci., IX, p. 51.
 1902. *Dichopetala* Morse, Psyche, IX, p. 381.
 1906. *Dichopetala* Kirby, Synon. Catal. Orth., II, p. 388.
 1907. *Dichopetala* Rehn, Proc. Acad. Nat. Sci. Phila., 1907, p. 56.
 1909. *Dichopetala* Rehn and Hebard, *ibid.*, 1909, p. 167.
 1912. *Dichopetala* Hunter, Pratt and Mitchell, Bull. 113, Bureau of Entom. U. S. Dept. of Agric., p. 50.

This genus was based on two species—*mexicana* and *emarginata* Brunner.

GENOTYPE: *Dichopetala mexicana* Brunner (selected by Kirby, 1906).

The genus is a member of the Phaneropterinae and of the group Odonturæ, constituting with the genera *Odontura* Rambur, *Pseudisotima* Schulthess, *Epiphlebus* Karsch, *Atlasacris* Rehn, *Peropyrrhicia*

¹ Color Standards and Color Nomenclature. By Robert Ridgway. Washington, D. C., 1912.

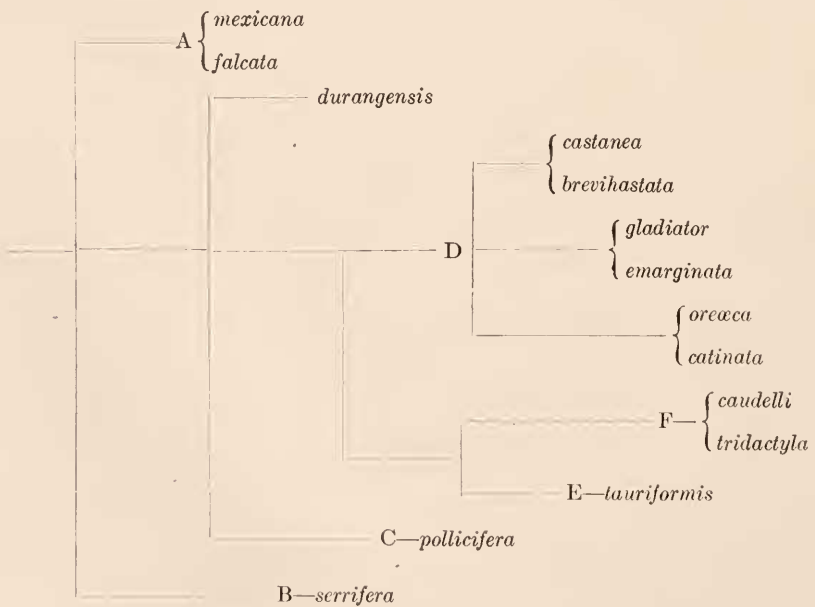
and *Angara* Brunner a section of the group. Of these genera all are exclusively Old World except *Angara*, which is Brazilian.

Generic Description.—Fastigium of vertex more or less compressed, short, not or distinctly sublamellate, not at all sulcate or finely sulcate proximad, more or less in contact with facial fastigium. Antennæ subcrassate proximad, from two to five times the length of the body. Pronotum not at all, or more or less constricted mesad, dorsum more or less arcuate in transverse section; caudal margins of lateral lobes more or less arcuate or subtruncate. Tegmina in male abbreviate; anal field extending nearly the entire length of tegmen; sutural margin at apex of stridulating vein obtuse-angulate to rectangular produced. Tegmina in female very short, not reaching or distinctly surpassing the caudal margin of the metanotum, overlapping, subcontiguous, or more or less decidedly remote from one another; distal margin of female tegmina arcuate to truncate. Abdomen more or less dilated; disto-dorsal abdominal segment with distal margin emarginate, bisinuate, truncate or arcuate, supra-anal plate simple or (in ♂ of *tauriformis*) bearing a dorsal erect T-shaped structure. Cerci of male incurved, acute, falciform, simple, with dorsal margin rarely serrato-dentate or with median tooth or lobe on dorsal or external face, occasionally with an accessory digitiform lobe from base. Subgenital plate of male broad and short or produced, more or less narrowed distad, free lateral margins concave, subparallel or converging, distal margin truncate or more or less deeply and completely V- or obomegoid emarginate, unicarinate or tricarinate ventrad. Ovipositor from one and one-half to three times the length of pronotal disk, more or less arcuate, apex more or less acuminate and with its margins serrato-dentate. Subgenital plate of female emarginato-truncate, arcuato-emarginate, or more or less completely divided into two halves, these more or less acute distad. Limbs more or less-elongate. Cephalic femora from one and one-half to three times as long as the disk of the pronotum in the male, one and one-third to two and one-half times in the female. Caudal femora from four to nearly seven times the length of the pronotal disk in the male, from four to five and three-fourths times in the female.

Classification.—From a systematic standpoint, the characters of greatest value in the differentiation of the species are: in both sexes, general form of the body and shape of the eyes; in the male, form of the pronotum, form of the tegmina, form of the cerci and subgenital plate; in the female, form of the pronotum, form of the tegmina,

relative size and width of space between the tegmina, form of the ovipositor and that of the subgenital plate. The general form is much more robust in some species than in others, the females almost always more robust than the males, in *falcata* and *pollicifera* less different in this respect than in the other forms. The outline of the eye is, in a few cases, of assistance in distinguishing females of closely allied forms, as *castanea* and *brevihastata*. The pronotum ranges from not at all constricted, to decidedly constricted mesad in both sexes. In the male sex the tegmina show modifications in the form of the margins and the width of the fields, the prominence of the stridulating vein and the projection of the sutural margin at the apex of the same vein. The tegmina of the female are as diagnostic as the more complex appendages of the male, their relative position and the interspace between the same, as well as the form of their margins, being of importance. The characters of the genitalia of the two sexes are discussed in detail below.

Morphological Notes on Male Genitalia.—The variation in structural form in the cerci of the male covers a number of types which show six different lines of development, relatively as follows:



The position of *durangensis* is more or less problematical, as we have only nymphal males.

The extremes in structural variation in the form of the cerci are a simple incurved falciform type, found in the group A, and one with a median tooth and an accessory lobe from the base, found in group F. The general cercal structure of the various groups can be presented best in tabular form.

Group A $\left\{ \begin{array}{l} \textit{mexicana} \\ \textit{falcata} \end{array} \right\}$ Simple, falciform.

Group B (*serrifera*).—Simple, dorsal margin serrato-dentate.

Group C (*pollicifera*).—With an external median tooth.

Incertæ sedis (*durangensis*).—With evidence of a dorsal median tooth.

Group D $\left\{ \begin{array}{l} \textit{castanea} \\ \textit{brevihastata} \\ \textit{gladiator} \\ \textit{emarginata} \\ \textit{oreæca} \\ \textit{catinata} \end{array} \right\}$ With a dorsal median fork, developing from a simple tooth to a large flattened lobe covering the greater portion of the distal section of the cercal shaft.

Group E (*tauriformis*).—With a greatly developed lobiform median tooth arising from the external margin of the shaft, the distal portion of the latter peculiarly modified. A transverse proximal lamella present dorsad on the shaft.

Group F $\left\{ \begin{array}{l} \textit{tridactyla} \\ \textit{caudelli} \end{array} \right\}$ With a dorsal median tooth and an accessory digitiform lobe from the base of the shaft.

The species in group D exhibit a regular development in the form of the dorsal median fork from a simple median tooth which becomes depressed and flattened, spreading laterad until it is as wide as the proximal portion of the shaft, to the other extreme which has it modified into a great inverted spoon-like plate covering the greater portion of the cercal shaft. The peculiar digitiform accessory appendage of *tridactyla* and *caudelli* springs from a proximal transverse ridge, which is apparently homologous with the more decided transverse lamella found in the same region in *tauriformis*.

From the evidence of eighteen immature males, belonging to six species (*durangensis*, *brevihastata*, *gladiator*, *oreæca*, *catinata*, and *pollicifera*), it is evident that the separation of the median fork of the cercus is never accomplished before the mature condition. Of *brevihastata* and *pollicifera* we have material representing two consecutive instars, one preceding the mature condition, the other species being represented by this stage alone. In the forms of which we have two stages no indication of the lobe is apparent in

the earlier instar, while in the other stage, in all of the species represented in this condition, there is a more or less distinct indication of an incipient lobe or tooth, this being most pronounced in *durangensis* and *catinata*. In the latter this embryonic lobe is more definitely formed than in *durangensis*, consisting of an ovate vertical area of relatively large size. In the closely related *oreæca*, the incipient lobe is not vertical, but horizontal in position.

The male subgenital plate is very varied in form, the distal margin ranging from truncate with lateral styliform processes to obomegoid emarginate; the general form broad with the distal portion little produced and narrowed, the lateral angles more or less blunted, to an opposite extreme, elongate, narrow, concave laterad with the lateral angles acute, between which extremes are a number of modifications of one or the other. Quite curiously, there exists no correlation between certain forms of cerci and certain forms of the subgenital plate, forms nearly related in cercal structure, as *oreæca* and *catinata*, having very different subgenital plates.

Morphological Notes on Female Genitalia.—The ovipositor ranges in general form from the elongate, very slender, decidedly arcuate type seen in *gladiator*, and the elongate robust type with a more or less straight ventral margin as found in a number of species, to a short, moderately arcuate form seen in *castanea* and *brevihastata*. It is evident that there is considerable individual variation in the depth of the ovipositor, this being very apparent in those species represented by considerable series, so much so that the extremes have different facies, but the major portions of such series always bridge the apparent gaps. In ovipositor length there is marked variation in *gladiator* and *brevihastata*, this being most apparent in the former species, the extremes of which are quite different in appearance. We have before us ten female nymphs which we can positively refer to five species (*durangensis*, *brevihastata*, *gladiator*, *oreæca*, and *pollificera*). Of *durangensis* we have represented the second instar preceding maturity, of *brevihastata* the two preceding maturity, and of the other three species the instar preceding maturity. From this material it is evident that the development of the ovipositor is very rapid, but in no case do the external margins acquire distal teeth until the mature condition is reached. In one specimen which is apparently on the eve of the last ecdysis (the type of *lavis*) the teeth of the enclosed ovipositor can be seen through the sheath when it is held to the light.

The subgenital plate of the female presents great diversity in

development, which in its details are not always correlative with apparent affinities. These diversities can be placed in two categories, one (*mexicana*, *falcata*, *durangensis*, *castanea*, and *brevihastata*) with the plate entire, the other (comprising the remaining species) with it divided completely in two, at least as far as the chitinous portion is concerned. In the first section we have from an extreme which is very broad and short, with the distal margin emarginato-truncate, to one of a similar general form with the margin bisinuate to arcuato-emarginate. In the second section we have even greater diversity, the paired lobes varying from broad to very narrow, blunted to aciculate, the general form of the margins differing to a lesser degree. In the forms with an entire subgenital plate, the distal margin has a different appearance when the plate is flat or when it is compressed; which factor should always be considered in determining the character of this margin. For the sake of uniformity, we have endeavored to give the character of this margin from the plate were it flattened out.

Notes on Tegminal Structure.—In the male the tegmina are more ample in *oreæca* and more reduced in size in *tridactyla* than in the other species. The angle of the sutural margin is very greatly produced in *tridactyla* and on the other hand almost imperceptible in *catinata*. The stridulating vein is apparent in all the forms of the genus, but variable in strength and curvature, while the tympanum is also of variable form and definition. In the female the considerable variation in form and position indicated in the generic description is not correlated with the general relationship of the forms, as certain species with overlapping quadrate tegmina and others with nearly contiguous similarly shaped tegmina occur in sections of the genus which on sum total of characters are well removed from one another. The reduction of the female tegmina has proceeded further in *emarginata* than in any other form of the genus, as there they are decidedly lateral and very small, while the development of the tegmina in the same sex is most marked in *falcata*, where they are overlapping, covering all of the metanotum and the greater portion of the proximal dorsal abdominal segment. The venation in the female tegmina is always generalized, being more complex in *falcata* than in any of the other forms.

Color Pattern.—The color pattern of all of the forms of this genus is similar in several respects; first, in the possession of pale paired lines extending from the eye caudad to the apex of the abdomen and, second, in the general uniformity of the lateral and ventral color. In the majority of the forms the color of the dorsum between the pale

lines is more or less uniform and, for convenience in describing the extent and character of the pattern, we have referred to this as the dorsal color, the ventral and lateral tones as the lateral color, and the pale paired lines and their developments as the pale pattern. The range of tone in all three of these principal components of the coloration is very considerable, the extreme on one hand having the pattern intense, the contrasts decided and the tones darker and richer, while in the other extreme the pattern is dilute, the contrasts poor and the tones paler and weaker. To facilitate reference to these extremes we have termed them the intensive and recessive extremes. In the recessive condition the pale pattern is frequently much restricted as well as weakened, while the dorsal color is often but little, in part only, or not at all different from the lateral color.

Distribution.—Extending from north-central Texas (Dallas), southern New Mexico (Dry Canyon and Mesilla Valley) and central southern Arizona (Tumamoc Hill and Sycamore Canyon), south to the upper Rio Balsas Valley in Guerrero, Mexico, on the west reaching Tepic and on the east the vicinity of the coast at Corpus Christi and Brownsville, Texas, and Tamos, Vera Cruz, Mexico. Vertically the genus ranges up to at least 6500 feet (in the Davis Mountains, Texas). It reaches its greatest diversity in southern Texas and the northern and central parts of the Mexican tableland.

History.—In 1878, Brunner² erected the genus for two species then described, viz., *mexicana* (from Mexico) and *emarginata* (from Texas). In 1880, Bormans³ described a species from Schoa, Abyssinia, as *Dichopetala massaïæ*, which has since been placed in the genus *Peropyrrhicia*, which is exclusively African. Scudder, in 1900, described⁴ a *Dichopetala brevicauda* from California, which we now know to be an *Arethæa* and not at all related to *Dichopetala*. In 1901, Rehn⁵ described a new form from Mexico as *D. pulchra*, basing it on material which he had previously recorded as *mexicana*. Scudder, in 1902, in Scudder and Cockerell's list of New Mexican Orthoptera⁶ described as new a species of the genus from New Mexico, calling it *Dichopetala brevicauda*, but as that name was preoccupied, Morse, at Scudder's suggestion, renamed the species *D. brevihastata*.⁷ In 1907, Rehn described a species from Arizona as *D. lavis*.⁸

² *Monogr. der Phaneropt.*, p. 76.

³ *Ann. Mus. Civ. Stor. Nat.*, Genova, XVI, p. 218, fig.

⁴ *Canad. Entom.*, XXXII, p. 331.

⁵ *Entom. News*, XII, p. 207.

⁶ *Proc. Davenport Acad. Sci.*, IX, p. 51.

⁷ *Psyche*, IX, p. 381.

⁸ *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 56.

Material.—In the preparation of the present paper the types of the following species have been before us:

(*Dichopetala pulchra* Rehn, synonym of *D. mexicana* Brunner.)

Dichopetala falcata n. sp.

Dichopetala serrifera n. sp.

Dichopetala durangensis n. sp.

Dichopetala pollicifera n. sp.

Dichopetala tauriformis n. sp.

Dichopetala castanea n. sp.

Dichopetala brevihastata Morse.

(*Dichopetala laevis* Rehn, synonym of *D. brevihastata* Morse.)

Dichopetala gladiator n. sp.

Dichopetala oreæca n. sp.

Dichopetala catinata n. sp.

Dichopetala tridactyla n. sp.

Dichopetala caudelli n. sp.

The entire series of the genus examined by us numbers 362 specimens. The great majority of these (239) were taken by the authors on recent trips and are located in the Hebard Collection and that of The Academy of Natural Sciences of Philadelphia. Of the remainder of the representation we have had before us, 37 specimens were from the Hebard Collection ex Brunner; 27, comprising the entire series of the genus in the United States National Museum, were examined through the kindness of Mr. A. N. Caudell; 50, forming the entire series in the Seudder Collection, were either loaned or made accessible to us by Dr. Samuel Henshaw, of the Museum of Comparative Zoölogy, and a few specimens each were loaned by the authorities of the Field Museum and the American Museum of Natural History. To the above-mentioned gentlemen and the authorities of these museums we wish to express our hearty thanks for their assistance in the work. We have, with their co-operation, been able to examine almost all of the material in America on which the records of the genus were based. Aside from the typical material of the two original species of the genus, no recorded specimens of the group exist in other collections.

KEY TO THE SPECIES.

Males.

A.—*Cercus* subfalciform, non-furcate.

B.—*Cercus* non-serrate.

C.—Length of pronotum equal to one-third that of cephalic femur. Subgenital plate produced into lobes.....
mexicana Brunner.

- CC.—Length of pronotum equal to two-thirds that of cephalic femur. Subgenital plate not produced into lobes.....
falcata n. sp.
- BB.—Cercus with the dorsal margin serrate. (Subgenital plate broadly subtruncate with decided lateral substyloform appendages.).....*serrifera* n. sp.
- AA.—Cercus with a median fork (either tooth or lobe). (No accessory digitiform lobe from base of cercus.)
- B.—Subgenital plate little produced. (Cercus with median tooth simple. Eyes ovate.).....*castanea* n. sp.
- BB.—Subgenital plate distinctly produced meso-caudad.
- C.—Subgenital plate greatly produced. Cercus with the tooth very long, as long as the remainder of the shaft, and needle-like distad.....*tauriformis* n. sp.
- CC.—Subgenital plate moderately produced. Cercus with the tooth not as long as the remainder of the shaft and not needle-like distad.
- D.—Cercus with the median tooth blunt and simple. (Eyes elliptical.).....*brevihastata* Morse.
- DD.—Cercus with the median tooth depressed and lamellate.
- E.—Cercus with the median lobe (*i.e.*, tooth) acute, not rounded when seen from the dorsum, placed on the external margin of the cercus. Pronotum little constricted mesad. General coloration green.....*pollicifera* n. sp.
- EE.—Cercus with the median lobe generally rounded when seen from the dorsum, placed on the dorsal face of the cercus. Pronotum moderately constricted mesad. Coloration variegated.
- F.—Subgenital plate with the distal margin weakly emarginate and the lateral angles blunted.....*gladiator* n. sp.
- FF.—Subgenital plate with the distal margin decidedly emarginate and the lateral angles acute (variable in degree).....
(?) *durangensis* n. sp.
- G.—Median lobe of cercus decidedly shorter than the proximal half of the cercal shaft.....*emarginata* Brunner.
- GG.—Median lobe of cercus at least as long as the proximal half of the cercal shaft, spoon-like in shape and inverted over the shaft.
- H.—Margins of the cercal lobe converging distad, apex hardly truncate, ventral margin of the lobe decidedly cingulate.....*oreæca* n. sp.

- HH.—Margins of the cercal lobe hardly converging distad, the apex subtruncate, ventral margin of the lobe weakly cingulate *catinata* n. sp.
- AAA.—Cercus with a dorsal median tooth and an accessory digitiform lobe attached at the dorsal base.
- B.—Tegmina shorter than the pronotum, the portion of the anal field of former distad of stridulating vein very brief, sutural margin at apex of this vein decidedly produced. Cercus with the median tooth proportionately longer *tridactyla* n. sp.
- BB.—Tegmina longer than the pronotum, the portion of the anal field of former distad of stridulating vein normal, sutural margin at apex of this vein slightly produced. Cercus with the median tooth proportionately shorter. *caudelli* n. sp.

Females.

- A.—Ovipositor very decidedly longer than the head and pronotum together.⁹
- B.—Tegmina slightly overlapping mesad.
- C.—Ovipositor hardly or not at all longer than half the length of the caudal femora. Subgenital plate not produced laterad into large trigonal lobes.
- D.—Size large (body 21.5 mm., pronotum 6.9, ovipositor 14.5). Ovipositor slenderer *falcata* n. sp.
- DD.—Size medium (body 15.5–18.2 mm., pronotum 4.1–4.3, ovipositor 10.2–10.5). Ovipositor more robust *durangensis* n. sp.
- CC.—Ovipositor distinctly longer than half the length of the caudal femora. Subgenital plate produced laterad into large trigonal lobes. (Size medium; pronotum not sellate.) *tauriformis* n. sp.
- BB.—Tegmina not attinent or subattinent mesad.
- C.—Subgenital plate compressed, truncate, shallowly arcuato-emarginate or biconvexo-emarginate distad. *mexicana* Brunner.
- CC.—Subgenital plate with distal margin very profoundly triangularly emarginate or broadly divided to the base.
- D.—Form slender, subcompressed. Pronotum narrow, elongate (of the type usual in the genus). Limbs and ovipositor proportionately longer than in the opposite category.
- E.—Subgenital plate with lateral apices very acute, more or less spiniform.

⁹Occasional specimens of *D. brevihastata*, which belong to the opposite category, have the ovipositor appreciably though not decidedly longer than the head and pronotum. These specimens are exceptional and do not represent the average condition of the species.

- F.—Ovipositor with ventral margin nearly straight except at distal extremity. Tegmina small.....*emarginata* Brunner.
- FF.—Ovipositor with ventral margin more (*gladiator*) or less (*oreæca*) arcuate. Tegmina medium sized.
- G.—Size large. Ovipositor slender. Limbs very elongate.....*gladiator* n. sp.
- GG.—Size medium. Ovipositor more robust. Limbs moderately elongate...*oreæca* n. sp.
- EE.—Subgenital plate with lateral portions trigonal, but apices blunted, non-spiniform. (Ventral margin of lateral lobes of pronotum distinctly sinuate. Eyes relatively prominent.).....*catinata* n. sp.
- DD.—Form compact and robust. Pronotum not elongate, short. Limbs and ovipositor proportionately shorter, the ovipositor robust.
- E.—Ovipositor not quite half as long as the caudal femora; subgenital plate with lobes rotundato-angulate.....*tridactyla* n. sp.
- EE.—Ovipositor equal to or slightly more than half as long as the caudal femora; subgenital plate with lobes quite acute.....*caudelli* n. sp.
- AA.—Ovipositor slightly or not at all longer than the head and pronotum together.
- B.—Tegmina separated by nearly or quite their own width. (Eyes elliptical.).....*brevihastata* M orse.
- BB.—Tegmina separated by much less than their own width.
- C.—Form more robust. Ovipositor elongate, slender.....*pollicifera* n. sp.
- CC.—Form slenderer. Ovipositor quite robust. *castanea* n. sp.

Dichopetala mexicana Brunner.

1878. *D[ichopetala] mexicana* Brunner, Monogr. der Phaneropt., p. 77, pl. I, fig. 6. [Cuernavaca, Morelos, Mexico.]
1897. *Dichopetala mexicana* Saussure and Pictet, Biol. Cent.-Amer., Orth., I, p. 315.
1900. *Dichopetala mexicana* Rehn, Trans. Amer. Entom. Soc., XXVII, p. 88. [Rio Cocula, Guerrero, Mexico.]
1901. *Dichopetala pulchra* Rehn, Entom. News, XII, p. 207. [Rio Cocula, Guerrero, Mexico.]

This species needs comparison only with *D. falcata* (*vide infra*), from which the male can be immediately separated by having the subgenital plate exerted in lobes, the female by having the tegmina not overlapping and both sexes by the proportionately more elongate limbs.

TYPES: ♂ and ♀; Cuernavaca, Morelos, Mexico. [Brunner Collection.]

We here describe a topotypic female from the Hebard Collection. (data: Cuernavaca, Mexico; January 4, 1899).

Description.—Size medium; form subcompressed. Head with the occiput subglobose, strongly descending to the antennal fossæ; fastigium compressed, short, subcultriform-lamellate dorsad, apex rounded when seen from the side and not projecting cephalad of the

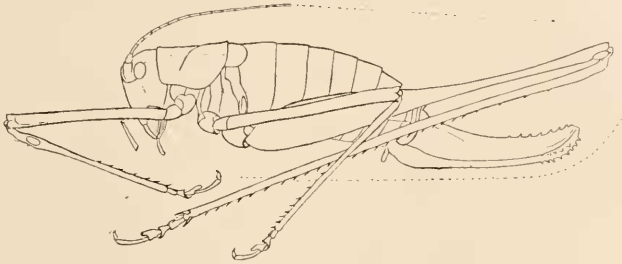


Fig. 1.—*Dichopetala mexicana* Brunner. Lateral outline of topotypic female. ($\times 2$.)

antennal scrobes, almost touching the facial fastigium; face, genæ, clypeus and labrum glabrous; eyes ovate in basal outline, moderately prominent; antennæ incomplete. Pronotum with the greatest dorsal length subequal to the greatest ventral width (across lobes) of same; dorsum of pronotum with the impressed transverse sulcus distinct, broadly V-shaped, placed mesad, the dorsum slightly constricted at the same point; cephalic and caudal margins of disk subtruncate; lateral lobes of pronotum with the greatest depth contained one and two-thirds times in the greatest dorsal length of the same, ventral margin subtruncate, cephalic and caudal angles of the same margin rounded, transverse sulcus marked only on the dorsal portion of the lobes and there descending obliquely ventro-cephalad. Tegmina very short, reaching the caudal margin of the metanotum, much broader than long, the greatest length contained twice in the greatest width, distal margin broadly arcuate, disto-costal and disto-sutural angles broadly rounded, sutural margins narrowly separated. Abdomen heavy; cerci very short, crassate, substyliform, the apex rather sharply attenuate; ovipositor heavy, robust, the length half that of the caudal femora, dorsal margin moderately arcuate, ventral margin straight for the median three-fourths, strongly arcuate proximad and distad,



Fig. 2.—*Dichopetala mexicana* Brunner. Ventral outline of subgenital plate of topotypic female. ($\times 4$.)

the proximal half of the whole ovipositor in consequence tapering to the middle, thence subequal in width to the subacute apex, dorsal margin strongly serrato-dentate for a third of its length from the apex, with nine to ten teeth, ventral margin armed in a similar fashion for a fourth of its distal length, with seven to eight teeth; subgenital plate moderately transverse, lateral margins broadly convergent, distal margin broadly and shallowly arcuato-emarginate, the lateral angles forming very short rectangulate lobes. Cephalic femora with the length slightly greater than the dorsal length of the ovipositor, slightly less than the ventral length of the ovipositor; cephalic tibiae slightly longer than the femora, spined on all the margins, foramina elliptical. Median femora very slightly longer than the cephalic pair. Caudal femora about two and one-third times the length of the cephalic femora, moderately inflated proximad, ventral margins unspined, genicular lobes spined; caudal tibiae surpassing the length of the femora by about the length of the pronotum, dorsal margins more heavily spined than the ventral ones.

Description of the Male Type (from Brunner).—Tegmina of male with the internal margin having a considerably produced angle. Cerci of male robust at base, not far from base horizontally incurved at a right angle, attenuate, compressed, acute acuminate. Subgenital plate of male very much flattened, attenuate in the middle, exerted caudad in two lobes.

Measurements (in millimeters).

	Cuernavaca, Mex.			Rio Coocula, Mex.
	♂ (TYPE, ex Brunner).	♀ (TYPE, ex Brunner).	♀ [Hebard Coll.]	♀ (TYPE of <i>pulchra.</i>). [A.N.S.P.]
Length of body (exclusive of ovipositor).....	18.	15.	17.5	20.
Length of pronotum	3.5	4.	5.	4.5
Greatest caudal width of disk of pronotum			3.7	3.2
Length of tegmen			1.6	1.
Greatest width of tegmen			2.6	2.2
Length of cephalic femur	10.	9.	10.	11.
Length of median femur.....			11.4	12.
Length of caudal femur	24.	23.	25.6	24.5
Length of ovipositor		12.	12.3	11.2

Color Notes.—The original color characters given by Brunner are as follows (paraphrased): Green. Occiput rufous, with a fine median line of sulphur. Pronotum rufous, disk fuscous, marked

with longitudinal lines of sulphur, approximating mesad. Tegmina of male green, disk fusco-maculate, external margin albo-vittate. All of the femora rufescent at their bases, toward the apices green, apex of the caudal femora, as well as the base of the caudal tibiæ, infusate. Abdomen of male fuscous dorsad, marked with a black line and a broad vitta of sulphur, distal segment of male rufous. Cerci of male nigro-lineate. Subgenital plate of male light green, lobes nigro-marginate internally at termination. Abdomen of female rufo-punctate. Ovipositor with both margins rufescent at apex.

The two females before us show considerable color variation which the following description covers.

General color of the face, genæ, lateral lobes of the pronotum, pleura, and greater portion of the lateral aspect of the abdomen honey yellow to dull green yellow, ventral aspect of the body similar but inclining toward wax yellow. Dorsal aspect of pronotum, fastigium, occiput, dorsum of abdomen, and dorsal portion of lateral aspects of the latter brick red to claret red. Eyes buckthorn brown to raw sienna, crossed obliquely by a fine seal brown line; antennæ with the two proximal joints largely morocco red to claret brown, remaining joints of dorsal color; ventral portion of infra-ocular region, at base of mandibles, with a more or less distinct blotch of claret brown. Pronotum with a pair of narrow discal lines varying from honey yellow to light viridine yellow, these bordered more or less distinctly on one or both (dorsal and lateral) margins by blackish lines, the pale lines regularly diverging cephalad and caudad from the middle of the pronotum; cephalic and caudal margins of the disk more or less distinctly beaded with blackish. Tegmina with the discoidal section of the color of the dorsum of the abdomen, occasionally washed in part with blackish; marginal field of lateral color; distal margin in one specimen edged narrowly with the green of the limbs, sutural region approaching the lateral color in the other specimen. Abdomen with traces of a seal brown pattern bordering the lateral section of the dorsal color, the pattern sometimes enclosing areas of the clear dorsal color and again merely a line of seal brown; marginal beading of segments distinct dorsad, more or less distinct laterad. Ovipositor of lateral color, more or less washed with parrot green, the rufous margin extending to the base on the dorsal margin and little proximad of the armed section on the ventral margin, dorso-proximal section with the sulcus more or less blackish. Limbs absinthe green to claret brown, proximal portion of the cephalic and median femora washed with chestnut when the general color of the

femora is green; apices of all the femora, or only the caudal femora, and the adjacent portion of the tibiæ blackish; caudal femora proximal with a reticulate pattern of blackish brown on the lateral face, a central line of which pattern is more or less decidedly indicated; distal portion of the caudal tibiæ and tarsi blackish.

Distribution.—The present species is known only from two localities on the slopes of the upper Rio Balsas Valley in the states of Morelos and Guerrero, Mexico. The species apparently has a range in vertical distribution extending from about 1900 to 5440 feet, from the evidence of the two localities from which it is now known.

Morphological Notes.—The ovipositor, as is usual in species of the genus, varies somewhat in length. The subgenital plate of the female shows considerable variation in the form of the distal margin, ranging from the truncate type originally described, through the moderately arcuato-emarginate condition found in our Cuernavaca topotype, to the moderately decided and distinct obtuse-angulate emarginate condition found in the Rio Cocula specimen. The tegmina of the female have a certain amount of variation in the distal margin of the same, this being more truncate in one of our specimens than in the other. There is also some little variation in the width of the interspace between the tegmina in the same sex.

Synonymy.—The senior author is responsible for the only synonym of the present species—*D. pulchra*. The female specimen on which that synonym was based was first recorded correctly by him as *D. mexicana*, but later differences in the subgenital plate were noticed which seemed of specific value, and the individual was separated as *D. pulchra*, its closest relationship being supposed to be with *D. emarginata*. The apparent difference on which this separation was made we now know to be untrustworthy, as the amount of compression of the plate produces a different form in the margins of the same. A certain amount of individual variation in the emargination of this plate is also evident from the form of it in the three known individuals of that sex.

Remarks.—Owing to our lack of male individuals of this species, the type of that sex being unique as far as known, we have placed the species in the male key from the evidence of the original description.

Specimens Examined.—2; 2 females.

Cuernavaca, Morelos, Mexico, January 4, 1899, 1 ♀. [Hebard Coll.]

Rio Cocula, Guerrero, Mexico, May 12, 1898, (Otis W. Barrett), 1 ♀. TYPE of *pulchra*. [A. N. S. P.]

Dichopetala falcata n. sp.

This species belongs to the same section of the genus as *mexicana*, but differs in the greater general size, the shorter limbs of the male, in the tegmina being overlapping in the female, the male subgenital plate being without exerted lobes, in the same portion in the female being distinctly emarginate and in the greater length of the ovipositor.

TYPE: ♂; Tepic, Mexico. (Eisen.) [Hebard Collection.]

Description of Type.—Size quite large (for the genus); form comparatively robust. Head with its greatest width contained about one and one-half times in the depth; occiput well inflated, steeply declivent to the very short, compressed, and sublammellate fastigium, the apex of which is very bluntly recurved, very slightly separated from the apex of the facial fastigium; eyes small, elliptical in outline,

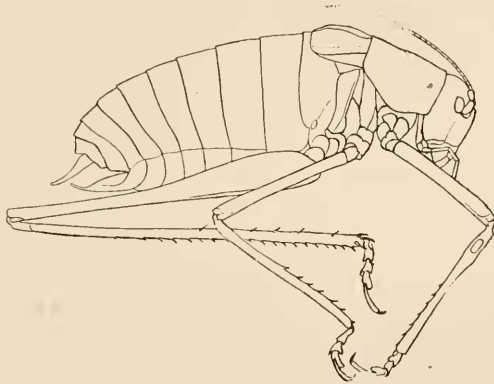


Fig. 3.—*Dichopetala falcata* n. sp. Lateral outline of type. ($\times 2$.)

the length about equal to half that of the infra-ocular portion of the genæ; antennæ elongate, proximal joint subdepressed. Pronotum with the greatest dorsal length subequal to the greatest width across the ventral portion of the lateral lobes, dorsal line when seen from the side straight, the whole dorsum slightly constricted mesad when viewed from the dorsal aspect; cephalic margin of disk moderately arcuato-emarginate, caudal margin truncate; but a single complete transverse sulcus present, this entering the disk laterad at the middle and on the middle of the disk strongly arcuate caudad; lateral lobes distinctly longer than deep, the greatest depth contained one and one-half times in the length of the same, ventro-cephalic angle very narrowly rotundato-rectangulate, caudal margin obliquely rotundato-truncate,

ventro-caudal angle very broadly rotundate, ventral margin slightly arcuato-emarginate. Tegmina with their exposed length about three-fourths that of the dorsum of the pronotum, broad, the greatest width slightly exceeding the length of the same, the general form subquadrate; marginal field regularly narrowing distad, distal extremity broadly arcuato-truncate, disto-costal angle narrowly rounded, sutural margin with the proximal angle distinct, subrect, thence the margin is obliquely biundulate to the distal margin; texture of the tegmina coriaceous, the principal veins poorly indicated, interstices obscurely and irregularly reticulate, stridulating vein strongly indicated. Disto-dorsal abdominal segment transverse, a rectangular depressed area present mesad; supra-anal plate transverse trigonal, the apex distinctly produced in a short slightly upturned acute process; cerci simple, depressed, falciform, the proximal third moderately broad, slightly lamellate laterad, distinctly tapering from the proximal third, the internal margin regularly arcuate, the external one with a rounded angle where the proximal



Fig. 4.—*Dichopetala falcata* n. sp.
Outline of apex of abdomen of type
seen from the dorsum. ($\times 3$.)



Fig. 5.—*Dichopetala falcata* n. sp.
Outline of ovipositor of allotype.
($\times 2$.)

lamellation disappears, the form of the whole cercus appearing bent-arcuate in consequence, apex acute; subgenital plate broad, short, narrowing distad, the apex very narrowly subtruncate. Cephalic femora about one and one-half times the length of the dorsum of the pronotum. Median femora nearly twice the length of the pronotum. Caudal femora with their length not greatly inferior to that of the body, distinctly but not greatly inflated proximad, ventral margins unarmed, genicular lobes very weakly or not at all spined; caudal tibiae distinctly but not greatly exceeding the femora in length, dorsal spines more numerous than the ventral ones.

ALLOTYPE: ♀; Tepic, Mexico. (Eisen.) [Hebard Collection.]

Description of Allotype.—Differing from the type in the following characters: Pronotum with the dorsal length slightly greater than the greatest ventral width across the lobes, median constriction extremely slight, hardly evident, cephalic margin emarginato-truncate, caudal margin truncate. Tegmina shorter, their exposed length no greater than half of the pronotal length, decidedly broader

than long, margins as in the male, the sutural margins overlapping for the greater portion of their length, with their form much the same as in the male. Disto-dorsal abdominal segment and the supra-anal plate similar in form to that found in the male, but the terminal tubercle of the latter is broader and less evident; cerci very short, crassate, tapering, apex acute; ovipositor with the length about one and one-half times that of the cephalic femora, moderately heavy, the dorsal margin regularly and distinctly arcuato-concave, ventral margin straight except at the extreme proximal and distal extremities, at the latter well arcuate dorsad to the subacute apex, for the distal third of the dorsal and a fourth of the ventral margins strongly serrato-dentate; subgenital plate transverse, distal margin bisarcuate emarginate, produced into brief trigonal lobes laterad. Cephalic femora slightly less than one and one-half times the length of the disk of the pronotum. Median femora about one and two-thirds times the length of the pronotum. Caudal femora with their length distinctly exceeding that of the body (exclusive of that of the ovipositor).

Measurements (in millimeters).

	Tepic, Mex.	
	♂ (TYPE.)	♀ (Allotype.)
Length of body.....	23.	21.5
Length of pronotum.....	5.5	6.9
Greatest ventral-width of pronotum.....	5.7	6.3
Length of tegmen.....	4.2	3.3
Length of cephalic femur.....	8.	9.2
Length of median femur.....	10.	11.
Length of caudal femur.....	21.5	25.
Length of caudal tibia.....	23.	26.5
Length of ovipositor.....		14.5

Color Notes.—Both specimens of this species seen by us have been at some time immersed in a liquid preservative which has completely removed their original color, leaving them in general a pale ochraceous. Fortunately, however, sufficient of the pattern remains to enable us to give a few notes on the same. Caudal portion of the occiput, which area is usually covered by the pronotum, seal brown, a very fine postocular line of the same and sometimes a similar weak medio-longitudinal line on the occiput present, the post-ocular continued ventro-cephalad across the eye; antennæ irregularly but very closely and strikingly annulate with seal brown. Pronotum with the disk margined laterad with fine continuations of the post-

ocular lines of the head, subparallel caudad to the transverse sulcus and thence distinctly but not greatly diverging (male), or regularly but very gently diverging throughout their entire length (female). Tegmina with the dorsum darker than the marginal field, the venation of the pale general color on a darker, nearly wine-colored, background, humeral trunk of the darker color. Abdomen with the dorsum of the proximal segments in the male narrowly edged cephalad with seal brown, this portion like that similarly colored on the occiput probably normally concealed; the dorsum of the abdomen separated from the sides by a more or less distinct line, which in position is continuous with the postocular line of the head and pronotum; caudal margin of the dorsal segments in the female more or less distinctly and broadly edged with darker color. Limbs more or less decidedly washed with madder brown, a slight edging of the same color on the dorsal margin of the ovipositor, the terminal teeth of the same tipped with seal brown.

Distribution.—This very striking species is only known from the type locality, the territory of Tepic, western Mexico.

Specimens Examined.—2; 1 male, 1 female.

Tepic, Mexico, (Eisen), 1 ♂, 1 ♀. TYPE and allotype. [Hebard Collection.]

Dichopetala serrifera n. sp.

On account of the peculiarly serrate cerci of the male, this species occupies a unique position, and comparison with other forms is not necessary.

TYPE: ♂; Barranca, twelve kilometers north of Guadalajara, state of Jalisco, Mexico. Altitude not less than 3,500 feet. September 13, 1933. (W. L. Tower.) [American Museum of Natural History.]

Description of Type.—Size medium; form subcompressed. Head with greatest width contained about one and one-half times in greatest depth; occiput moderately declivent to fastigium and antennal scrobes; fastigium low, acuminate, faintly sulcate dorsad, ventrad subattingent with frontal fastigium; eyes moderately prominent, reniform in basal outline, depth about two-thirds that of the infra-ocular portion of the genæ; antennæ incomplete. Pronotum moderately sellate, greatest ventral width about five-sixths that of the dorsal length of the pronotum, greatest caudal width of disk about two-thirds length of same; cephalic margin of disk very broadly and shallowly obtuse-angulate emarginate; lateral margins of disk of pronotum (as indicated by color pattern) slightly con-

verging caudad from the cephalic margin to the middle, thence decidedly diverging to the caudal margin; transverse sulcus rather weak except at median line, crossing margins of disk mesad, broadly V-shaped on disk; lateral lobes with the greatest depth contained one and two-thirds times in the greatest dorsal length of lobes, cephalic margin straight, ventro-cephalic angle obtuse, ventral margin obliquely sinuato-truncate, ventro-caudal angle more or less

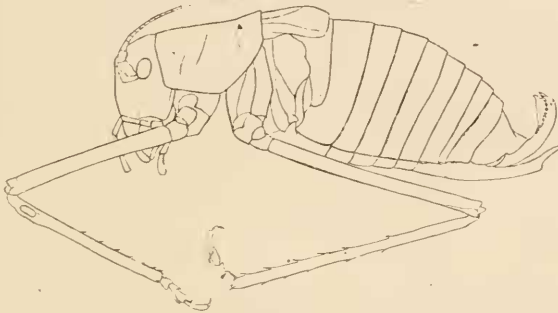


Fig. 6.—*Dichopetala serrifera* n. sp. Lateral outline of type. ($\times 3$.)

broadly rounded, caudal margin obliquely subtruncate except for a short dorsal section which is truncate with the caudal margin of the disk. Tegmina subequal to four-fifths the length of the pronotal disk, width of discoidal and anal fields subequal to the caudal width of pronotal disk; marginal field broad, costal margin gently arcuate, strongly arcuate distad, distal extremity of whole tegmen obliquely truncate, sutural margin strongly obtuse-angulate produced at the apex of the stridulating vein, distad of this projection straight and rounding into the distal margin; stridulating vein decided, straight, distal portion of stridulating field with anastomosing short cross veins. Disto-dorsal abdominal segment with main portion of same truncate distad, a broad triangular impressed area indicated; supra-anal plate trigonal with the apex briefly and narrowly fissate; cerci with the proximal half robust proximad, thence decidedly tapering, at the middle the shaft is bent rather sharply meso-dorsad, subdepressed and slightly expanded at the apex, the margins proper unarmed, dorsal face with an elevated ridge bearing ten to eleven teeth of unequal width but subequal length, the distal extremity of

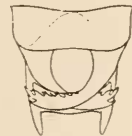


Fig. 7.—*Dichopetala serrifera* n. sp. Outline of apex of abdomen of type from dorsum. ($\times 3$.)

the cercus proper rectangular, distal extremity of the toothed ridge with the terminal tooth distinctly projecting, immediately proximad of which, on what is properly the lateral margin of the shaft, is placed an extra adpressed tooth; subgenital plate very ample, moderately produced, lateral margins subparallel, distal margin arcuato-truncate, lateral angles produced into considerable styliform appendages, which in length are about equal to one-half the distances between their bases. Cephalic femora slightly more than one and one-half times the length of the dorsum of the pronotum; cephalic tibiae with foramina elliptical. Median femora one-third again as long as the cephalic femora. Caudal limbs damaged.

Measurements (in millimeters).—TYPE: length of body, 16.5; length of pronotum, 5; greatest dorsal width of pronotum, 3.7; length of tegmen, 4; width of discoidal and anal fields of tegmen, 3.3; length of cephalic femur, 8.2; length of median femur, 10.

Color Notes.—General color cinnamon buff. Dorsum of proximal portion of occiput, extending cephalo-laterad as far as the eyes, disk of pronotum, proximal portion of anal field of tegmina, intermarginal section of proximal third of the sutural margin of the same, greater portion of discoidal field of same and dorsum of abdomen, sharply delimited laterad, black. Medio-longitudinal region of pronotum and abdomen with a bar varying from burnt sienna to clay color, this area narrow cephalad on the pronotum, somewhat expanded caudad on same, very poorly defined on abdomen and there broad mesad. Eyes cinnamon brown flecked with blackish brown; antennae with the two proximal joints touched with claret brown laterad, remaining joints and ventral surface of the two proximal ones black, the simpler joints narrowly annulate with the general color distad. Lateral lobes of the pronotum sparsely and weakly punctulate with bone brown. Tegmina with region of humeral trunk burnt sienna; edge of proximal third of sutural margin of general color. Lateral aspect of abdomen rather heavily punctulate with bone brown; margins of all segments more or less beaded light and dark; a pale unmarked area present on each side of abdomen in the position usually occupied, in species of the genus, by pale bands; disto-dorsal abdominal segment with the black of the dorsum limited to proximo-laterad trigonal areas. Limbs more or less weakly washed with victoria lake, the femora considerably and tibiae less decidedly lined and speckled in linear fashion with black; tarsi black.

Distribution.—The species is only known from the type locality.

Remarks.—The type of this remarkable species is unique.

Specimens Examined.—1; 1 male.

Barranca, twelve kilometers north of Guadalajara, state of Jalisco, Mexico, elevation about 3,500 feet, September 13, 1903 (W. L. Tower), 1 ♂. Type. [Amer. Mus. Nat. Hist.]

Dichopetala durangensis n. sp.

Related, as shown by the female sex, to *D. falcata*, from which it differs in the much smaller size, the more sellate pronotum, the relatively more prominent and larger eyes, the shorter and more abbreviate tegmina, the more decidedly trigonal extremity of the disto-dorsal abdominal segment and in the much more robust ovipositor. The available males are not mature, but they show conclusively that the species has a median tooth or lobe on the cercus, while *falcata* has the same simple, aside from which the form of the subgenital plate is characteristic. As the females of all of the species except *D. serrifera* are known, we have no hesitation in describing the species without

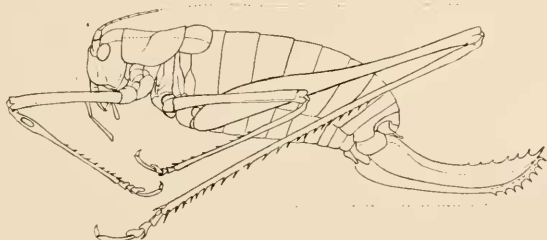


Fig. 8.—*Dichopetala durangensis* n. sp. Lateral outline of type. ($\times 2$)

adult males, as the possibility of the present form being the female of *serrifera* is exceedingly remote.

TYPE: ♀; Durango, Mexico. (Palmer.) [Scudder Coll.]

Description of Type.—Size medium; form rather robust. Head with the occiput sharply declivent to the fastigium, strongly arcuate in transverse section; fastigium little elevated, slightly recurved at the apex, elongate, but little compressed, shallowly sulcate dorsad, ventrad touching the fastigium of the face; eyes moderately prominent, ovate, the depth of same at least two-thirds that of the infra-ocular portion of the genæ; antennæ incomplete. Pronotum weakly sellate, broad, the greatest ventral width but slightly surpassing the greatest dorsal length of disk; disk of pronotum with the lateral margins, which are weakly indicated structurally by calloused lines and strongly by color pattern, parallel to the transverse sulcus, which

severs the same mesad, thence slightly divergent caudad; cephalic margin of disk weakly arcuato-emarginate, caudal margin of same truncate, width of disk caudad contained about one and one-third



Fig. 9. — *Dichopetala durangensis* n. sp. Dorsal outline of head, pronotum and tegmina. (× 2.)

times in the length of the same; transverse sulcus forming a broad V-shaped pattern mesad on the disk; lateral lobes of the pronotum with the greatest depth contained one and two-thirds times in the dorsal length of the same, cephalic margin of same very faintly emarginate dorsad, ventro-cephalic angle rotundato-rectangulate, ventral margin moderately sinuato-truncate, ventro-caudal angle broadly rounded, caudal margin obliquely arcuato-truncate. Tegmina with the

exposed portion about two-fifths the length of the dorsum of the pronotum, transverse, greatest width about twice the apparent length, considerably overlapping mesad; costal margin obliquely arcuate, sutural margin subtruncate, distal margin subtruncate, disto-sutural angle narrowly rounded; marginal field comprising about two-fifths the entire tegminal width. Supra-anal plate rotundato-trigonal, the distal margin of same slightly thickened and recurved; cerci very short, conical, apex slightly incurved; ovipositor about one-half the length of the caudal femora, moderately falciform, median depth about one-sixth of the length, dorsal margin considerably and regularly arcuate, ventral margin for about three-fourths of the length subtruncate, the distal fourth of the ventral margin strongly arcuate, dorsal margin with distal two-fifths armed with six to seven decided teeth which are well spaced and increasing in length distad, ventral margin armed on distal fourth with nine spines, which increase in length distad and are slightly recurved at the same end of series; subgenital plate small, broadly emarginato-truncate mesad, laterad with short trigonal lobes at the angles. Cephalic femora slightly shorter than length of head, pronotum and tegmina combined, very faintly clavate distad; tibiae distinctly exceeding the femora in length, tympanum small, elliptical. Median femora one-third longer than the cephalic femora. Caudal femora moderately elongate, proximal dilation moderate, regularly tapering to the narrow subequal distal portion; caudal tibiae exceeding the femora by about one-half the length of the pronotal disk.

Notes on Male Sex.—As all the specimens (two in number) of this sex are immature, we can give only a few notes on the genitalia as there found. The cerci are provided mesad on the dorsal surface

with the beginning of what is unquestionably in the adult a very decided lobe, the distal margin of which in the nymphal condition is nearly rectangulate, the whole being considerably elevated dorsad of the shaft of the cercus. The distal portion of the cercus is little curved, robust, slightly depressed, the apex acute. Subgenital plate moderately produced, subequal in width, the distal margin deeply rotundato-emarginate, the lateral angles acute, slightly recurved toward the median line.

Paratypic Series.—We have before us two paratypic adult females, one of which is measured below.

Measurements (in millimeters).

Durango, Mex.

	(TYPE.) ♀	(Paratype.) ♀
Length of body (exclusive of ovipositor).....	15.5 ¹⁰	18.2 ¹⁰
Length of pronotum.....	4.3	4.1
Greatest dorsal width of pronotum.....	3.2	2.9
Length of tegmen.....	2.	2.
Greatest width of tegmen.....	3.2	2.9
Length of cephalic femur.....	7.3	7.5
Length of median femur.....	8.9	9.
Length of caudal femur.....	20.2	.....
Length of ovipositor.....	10.5	10.2

*Color Notes.*¹¹—General shade ranging from old gold to oil green, on the pronotum paling (in the old-gold individual) to light viridine green. A pair of narrow lines of blackish are more or less distinctly indicated, extending from the dorsal margin of the eye caudad over the sides of occiput and along the lateral angles of the pronotal disk, margined laterad by a band of empire yellow of varying width and definition. Eyes argus brown, blotched with blackish; antennæ with the two proximal joints ranging from claret brown to burnt sienna, remaining joints blackish with narrow dull apricot yellow distal annuli; occiput more or less washed with very dull weak maroon. Dorsum of pronotum with cephalic half of disk very weakly washed with morocco red, a medio-longitudinal line of

¹⁰ In both of these females the abdomen has been bent ventro-cephalad and in consequence the length given above is not the real length of the insect, but only the shortest distance between the point of the fastigium and the base of the ovipositor. It is not possible to get a true measurement of length from the present material.

¹¹ In the present notes only the two well-preserved adults have been used, a few notes on the nymphs being placed at the end.

seal brown present, the latter finely divided cephalo-caudad by a thread of morocco red; cephalic and caudal margins of disk with more or less regular and decided beading of blackish, the whole of the pronotum* with a more or less decided sprinkling of bay colored points which vary in intensity with the blackish lateral lines. Tegmina varying from apricot orange to hazel, humeral trunk hay's russet. Abdomen with the proximo-dorsal portion of each segment (these areas hidden when the abdomen is not stretched) blackish, distal margin of segments more or less beaded with blackish or prout's brown, the entire surface dorsad and laterad more or less sprinkled with stipples of the latter color. In line with the postocular line and tegminal humeral trunk there is continued to the apex of the abdomen a pattern, which is indicated by a limiting to the region between the same of the decided marginal beadings and the proximal blackish markings of the segments, or a pale line similar in color to the pale portion of the postocular line. Mesad on the abdomen is indicated more or less distinctly a line similar in color to the above-mentioned yellowish lateral ones. Limbs more or less washed with madder brown, lined and dotted in linear fashion with black; caudal femora proximad of the color of the lateral lobes of the pronotum triply lined with blackish; all tibiae lined dorsad and laterad with blackish. Ovipositor more yellowish than the general tone, with the dorsal margin more or less maroon. The type has the general color old gold with the abdominal segments blackish proximad. One of the nymphs is nearly uniform parrot green, another ochraceous-tawny, both with pale postocular lines, and the third with the two colors combined, the first cephalad and the second caudad, the limbs and whole dorsum strongly punctulate with black and the lined pattern very decided blackish and whitish, the medio-longitudinal line continued on the head.

Distribution.—The species is only known from Durango, Mexico.

Remarks.—Of the material known belonging to this most interesting and beautiful species, one adult female has been badly damaged in the past by insect pests, so it has not been considered in the previous description. The nymphs are not perfect, but there can be no question of their identity with the adult females.

Specimens Examined.—7; 4 females, 2 male nymphs, 1 female nymph.

Durango, Mexico (Palmer), 3 ♀ (TYPE, paratypes), 2 ♂ nymphs, 1 ♀ nymph. [Scudder Coll.]

Durango, state of Durango, Mexico, November 27, 1909, (F. C. Bishop), 1 ♀. [U. S. N. M.]

Dichopetala pollicifera n. sp.

This very distinct species requires comparison with none of the other forms of the genus, the general build, nearly uniform greenish coloration, depressed external tooth on male cercus and the form of the tegmina readily distinguishing it.

TYPE: ♂; Brownsville, Cameron County, Texas. July 31–August 5, 1912. (Hebard.) [Hebard Collection.]

Description of Type.—Size medium; form quite robust (for the sex); surface smooth, unpolished. Head not at all elevated dorsad of the level of the disk of the pronotum, occiput roundly but rather

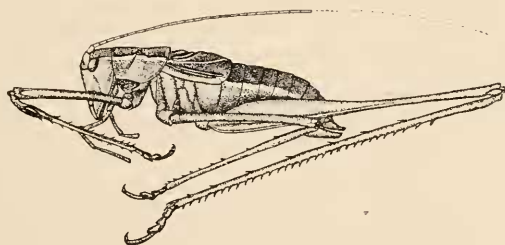


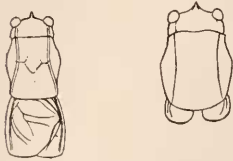
Fig. 10.—*Dichopetala pollicifera* n. sp. Lateral view of type. (× 2.)

decidedly declivent cephalad; fastigium narrow, very acute lanceolate, low, dorsum subsulcate, caudad from the base of the fastigium extends for a short distance a faint elevated line, ventral portion of the fastigium of the vertex touching the fastigium of the front; eyes very prominent, ovate, the greatest width contained about one and one-half times in the depth of the eye, the depth of the eye contained about one and one-half times in that of the infra-ocular portion of the genæ; antennæ filiform, rather heavy, in perfect specimens (the type has the antennæ broken) about three times as long as the body. Pronotum with the greatest (ventral) width but little less than the length of the dorsum of the pronotum, caudal width of the dorsum contained about one and one-third times in the length of the same, dorsum straight cephalo-caudad when viewed from the lateral aspect, appreciably arcuate in transverse section, cephalic margin of the disk emarginato-truncate, caudal margin faintly arcuate, slightly flattened with the faintest possible sinuation mesad, lateral margins of the disk indicated by the usual callous lines,



Fig. 11.—*Dichopetala pollicifera* n. sp. Outline of apex of abdomen of type from dorsum. (× 4.)

severed once and then by the transverse sulcus, which is placed very slightly cephalad of the middle, subparallel caudad to this sulcus, thence slightly diverging to the caudal margin; transverse sulcus of a V-shaped form mesad; lateral lobes with the greatest depth contained about twice in the greatest (dorsal) length of the same, cephalic margin nearly straight, ventro-cephalic angle nearly rectangulate, ventral margin arcuato-sinuate cephalad and arcuately expanded caudad, rounding into the oblique, slightly arcuate caudal margin, transverse sulcus impressed dorsad. Tegmina with their



Figs. 12 and 13.—*Dichopeltala pollicifera* n. sp. Dorsal outline of head, pronotum, and tegmina of male type (12) and female allotype (13). (× 2.)

length subequal to that of the dorsum of the pronotum, their greatest width (not flattened) subequal to their length; costal margin straight with the disto-costal angle well rounded, distal margin bluntly arcuate, passing broadly without any sign of angulation into the strongly oblique and gently arcuate distal portion of the sutural margin, proximal portion of the sutural margin obliquely truncate, at the extremity of the stridulating vein slightly produced, rotundato-rectangulate; marginal

field very narrow; discoidal field with a fine, irregular network of veins; stridulating vein slightly oblique, slightly arcuate; tympanum very faintly outlined, trigonal, the sharpest angle directed mesoproximad; proximal portion of the anal field (*i.e.*, proximad of the stridulating vein) closely but rather coarsely areolate. Abdomen quite plump; disto-dorsal abdominal segment strongly arcuato-emarginate laterad by the bases of the cerci; supra-anal plate forming a transverse lappet which has its greatest length contained about three times in its greatest width, distal margin of same truncate, broadly arcuate laterad; cerci simple, heavy, slightly depressed, distal portion of the cercus and median tooth decidedly depressed, the distal portion of the cercus tapering, acute, the immediate apex very fine, clawlike and slightly hooked, median tooth placed on the external face of the cercus, broad, bluntly lanceolate, reaching about half way from the point of its origin to the apex of the cercus, closely apposed to the shaft of the cercus for the greater portion of its length; subgenital plate moderately elongate, V-shaped in section, distal half with the margins moderately and regularly convergent, distal extremity deeply V-emarginate, the emargination extending slightly more than a fourth the way to the base of the plate, laterad of the

median emargination the converging lateral margins cause the lateral angles to appear as acute trigonal projections with their immediate angles blunted. Cephalic femora nearly twice as long as the dorsum of the pronotum, slender; cephalic tibiæ appreciably exceeding the femora in length, foramina elliptical. Median femora subequal to the head, pronotum and tegmina in length, similar in build to the cephalic femora; median tibiæ exceeding the femora by about the same proportion as in the cephalic limbs. Caudal femora one and one-third times as long as the body, very moderately inflated in the proximal half, slightly compressed, genicular lobes not distinctly spined, but with a minute point (sometimes absent) at the apex of each lobe; caudal tibiæ surpassing the femoral length by about four-fifths the length of the dorsum of the pronotum.

Allotype: ♀; Brownsville, Cameron County, Texas. July 31–August 5, 1912. (Hebard.) [Hebard Collection.]

Description of Allotype.—The following characters are solely those of difference from the above description of the type, features not mentioned are essentially as in the male sex.

Size large (for the genus); form robust. Head noticeably broad, the greatest width nearly equal to the depth of the head as far as the clypeal suture; fastigium very brief, slightly elevated at the extremity; eyes moderately prominent, slightly compressed, ovoid, their depth contained slightly more than one and one-half times in the depth of the infra-ocular portion of the genæ; antennæ about one and one-half times the length of the body. Pronotum heavy, the dorsum more arcuate in section than in the opposite sex, caudal width of the disk contained one and one-third times in the length of the same, greatest ventral width of the pronotum equal to about five-sixths of the length of the dorsum of the same; cephalic margin of the disk

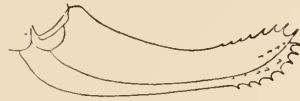


Fig. 14. — *Dichopetala pollicifera* n. sp. Outline of ovipositor of allotype. (× 4.)

emarginato-truncate, caudal margin of the same moderately arcuate, no appreciable callous bounding lines present on the disk, which rounds into the lateral lobes; transverse sulcus weakly indicated, placed mesad and on the middle of the disk impressed in a broad, V-shaped figure; lateral lobes with the greatest depth contained one and two-thirds times in the dorsal length of the same, margins as in the males but with the ventro-cephalic angle blunter. Tegmina with their apparent length about one-fourth that of the pronotum, their greatest width nearly two and one-half times their visible

length, interspace between the tegmina very slightly less than half the apparent length of the tegmina; distal extremity of the tegmina arcuato-truncate, broadly rounding to the costal margin and more narrowly to the sutural margin. Supra-anal plate very broad trigonal, apex very blunt; cerci short, conical, distal portion slightly elongate; ovipositor subequal to the combined length of the head, pronotum and tegmina, the greatest proximal depth contained slightly more than three times in the length of the same, moderately tapering in the proximal two-thirds, moderately arcuate, dorsal margin moderately arcuate, ventral margin with slightly more than the median half of its length nearly straight, considerably arcuate proximad, strongly arcuate distad, general angle of the margins distad slightly more acute than a rectangle, distal fourth of the dorsal margin with seven to eight teeth, low proximad and increasing in length distad, erect, directed disto-dorsad, ventral margin with the distal fourth armed with eight to nine spines, slightly increasing in length distad, the extreme distal ones slightly hooked; subgenital plate small, V-emarginate distad for about half of its length, the portions of the plate laterad of the median emargination present as acute trigonal lobes, the apex of which is slightly beyond the general form of the lobe. Cephalic femora about one and one-half times the length of the dorsum of the pronotum, more robust than in the male sex. Median femora about a third again as long as the cephalic femora. Caudal femora slightly more robust than in the male, but of similar proportions.

Paratypic Series.—A series of fourteen males and eight females bearing exactly the same data as the type and allotype have been selected as paratypes.

Measurements (in millimeters).

	♂♂ Brownsville, Tex.		
	(TYPE.)	(Paratypes.)	
Length of body	16.	17.	15.
Length of pronotum	4.2	4.4	3.8
Greatest dorsal width of pronotum	3.2	3.2	3.2
Length of tegmen	4.2	4.	4.2
Greatest width of discoidal and anal fields of tegmen	3.8	3.8	3.3
Length of cephalic femur	8.	6. ¹²	7.3
Length of median femur	9.5	10.6	9.
Length of caudal femur	21.5	22.3	19.4

¹² Regenerated limb. The other cephalic limb is lacking.

	♀ ♀ Brownsville, Tex.		
	(Allotype.)	(Paratypes.)	
Length of body (exclusive of ovipositor)...	18.	21.	16.
Length of pronotum.....	5.7	5.6	5.5
Greatest width of dorsum of pronotum ¹³	4.2	4.3	4.
Apparent length of tegmen.....	1.4	1.5	1.4
Greatest width of entire tegmen.....	3.	3.	2.5
Length of cephalic femur.....	8.4	8.1	8.9
Length of median femur.....	10.2	10.	10.4
Length of caudal femur.....	24.	23.8	23.5
Length of ovipositor.....	9.5	9.3	9.

In size the type represents what is the average of the entire male paratype series, practically none but the extremes measured above varying appreciably from the more general size. The allotype is in most measurements the maximum extreme for the female sex, from which the series grades rather evenly to the minimum measurements given for that sex. The length of the body is an uncertain measurement, as it depends so largely on the stuffing of the abdomen, and, while the present series was stuffed in its entirety by the authors, a certain amount of variation in bulk is impossible to prevent. The length of the cephalic femora, particularly in the female sex, shows appreciable variation—in females of approximately the same bulk measuring 7.8 and 9.2 mm. This variation is also noticed in the median femora, while the tibiae of the respective limbs vary proportionately. Such variation in the length of the caudal femora as is evident is of a far less degree and not disproportionate to the general bulk variation. The tegmina of the male show some variation in length, never being shorter than the pronotal length, but occasionally surpassing the same.

Color Notes—The general pattern of the male sex consists of a dorsal shade covering the dorsum of the head, disk of the pronotum; another covering the tegmina (aside from the marginal field and region of the principal veins); a paler lateral color involving the face, sides of head, lateral lobes of the pronotum, and sides of the abdomen; an area covering the dorsal surface of the abdomen either concolorous with or darker than the dorsal shade of head, pronotum and tegmina, and a pair of pale, narrow postocular lines extending along the angle

¹³ Owing to the poor definition of the dorsum of the pronotum in the female, this measurement is of less value than in the male, but it is here given to cover relatively the same portion as that measured in the other sex.

of the tegmina, involving the whole marginal field of the tegmina and dividing the dorsal and lateral colors of the abdomen. The female sex is so unicolorous that it has no pattern distinctive enough to describe. The color of the dorsum of the head, pronotum, discoidal and anal fields of the tegmina and the limbs of the male ranges from yellowish oil green to cosse green,¹⁴ occasionally lined along the internal margin of the pale lateral pronotal lines with maroon, and in all thickly and more or less regularly sprinkled with very minute points or stipples of the same color. Discoidal and anal fields of the male tegmina varying from lettuce green to serpentine green;¹⁵ area of the principal veins (*i.e.*, humeral trunk) more or less broadly and strongly lined with a shade varying from morocco red to maroon. Paired pale lines in the male (also covering the marginal field of the tegmina) varying from cream-white to light green-yellow, less prominent on the abdomen in some specimens than in others. Dorsal color of the abdomen sometimes the same as the dorsal color of the pronotum, again as dark as the major portion of the tegmina, and in a fair proportion ranging through pompeian red to madder brown. such brownish tones being due to a great increase in number of the overlying stipple points of those colors, similar to the condition found on the dorsum of the pronotum. These points are also present in individuals having an apparently uniform greenish dorsal tone on the abdomen, but they are so few that they do not affect the general shade. Lateral color in the male ranging from javel green to cosse green, sulphine yellow in a single individual.¹⁶ General color of female varying from uniform lettuce green to snuff brown dorsad, all finely and more or less thickly stippled with garnet brown to maroon (one specimen), paling into court gray on the sides of head, pronotum, and pleura; tegmina of the dorsal color with marginal field pale and a line of maroon present on the principal veins. Pale lines indicated but weakly in a few specimens on head and pronotum, not present on abdomen. Limbs unicolorous with the dorsum of the pronotum in both sexes. Eyes in both sexes varying from russet brown to hazel, crossed obliquely dorsad of the middle by a fine line of chestnut brown, which touches the caudal margin of the eye at the ventral margin of the pale postocular line. Antennæ in both

¹⁴ Frequently the pronotum is in part paler than these shades, but this is apparently due to the stuffing and drying, so that no importance is here attached to such fluctuation in the color of the dorsum of the pronotum.

¹⁵ The latter in but one specimen, the remainder between lettuce green and spinach green.

¹⁶ The latter shade may be due to drying, as it is found in but a single specimen

sexes ranging from olive ochre to lime green, the proximal joints more or less speckled with maroon. Tibial spines tipped with black. Ovipositor of the general color tone and usually of the dorsal shade, finely stippled with garnet brown and dorsal margin more or less washed with same.

Distribution.—The present species is known only from three localities in the arid tropical Tamaulipan region of southern Texas, Brownsville, Piper Plantation (along the Rio Grande about ten miles southeast by east of Brownsville), and Lyford (in the same county about forty-seven miles north of Brownsville). It doubtless ranges over an adjacent section of Mexico.

Biological Notes.—At Brownsville and Piper Plantation the present species was scarce and local, occurring in tangles of *Clematis* (probably *C. reticulata*) growing over the ground and on low mesquite and huisache. Individuals, when disturbed, endeavored to hop, crawl, or drop into recesses of these vines, where they are so well protected by their coloration that beating was the best method of securing them. At Lyford the single specimen was taken with *D. gladiator* in a weedy field which had a low cover of sand spur (*Cenchrus* sp.) and grasses. This species was found to be by far the least active of any of the forms of the genus taken by the authors.

Morphological Notes.—In the female sex the interspace between the tegmina varies from one extreme, in which the sutural margins are touching, to one in which the space separating them is nearly half of the width of a single tegmen.

Remarks.—The possibility of confounding this very peculiar species with any other form of the genus is very remote. It is interesting that in a region which has been examined as often as the Brownsville section, as striking a species as this should have been overlooked, for which the character of its habitat is probably responsible.

Specimens Examined.—43; 17 males, 9 females, 17 nymphs.

Brownsville, Cameron County, Tex.; July 31–August 5, 1912; (H.); 16 ♂, 9 ♀ (TYPE, allotype, paratypes), 6 ♂ nymphs, 9 ♀ nymphs.

Piper Plantation, near Brownsville, Cameron County, Tex.; August 3, 1912; (R. & H.); 2 ♀ nymphs.

Lyford, Cameron County, Tex.; August 6–7, 1912; (R. & H.); 1 ♂.

***Dichopetala castanea* n. sp.**

1912. *Dichopetala brevihastata* Hunter, Pratt and Mitchell (not of Morse), Bull., 113, Bureau of Entom., U. S. Dept. of Agr., p. 50. (Part) [Corpus Christi and Maverick County, Texas.]

This species differs from its nearest ally—*D. brevihastata* Morse—in

the broad, hardly produced subgenital plate of the male, in the more spiniform and strongly incurved distal portion of the male cercus, in the slightly deeper lateral lobes of the pronotum in both sexes, in the broader and more approximate tegmina of the female, in the less tapering ovipositor, which has the ventral margin straighter, and in the broader, more ovate, and less elliptical eye.

TYPE: ♂; Laguna del Gato, three miles west of Sam Fordyce, Hidalgo County, Texas. Elevation 175–200 feet. August 6, 1912. (Rehn and Hebard.) [Hebard Collection.]

Description of Type.—Size medium; form moderately slender; surface subglabrous. Head with the occiput not elevated dorsad of the level of the pronotum, gently arcuate; fastigium compressed,

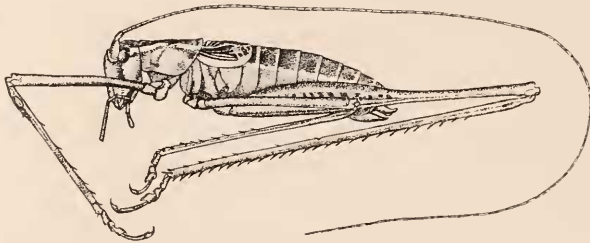


Fig. 15.—*Dichopetala castanea* n. sp. Lateral view of type. ($\times 2$.)

lamellate, barely touching the frontal fastigium; eyes prominent, ovate, the greatest width contained less than one and one-half times in the length, the length of the eye contained about one and one-third times in the infra-ocular length of the genæ; face moderately flattened; antennæ over three and one-half times as long as the body, filiform. Pronotum with the dorsum subdeplanate, strongly narrowed mesad, the margins of the same regularly converging caudad from the cephalic margin and from the middle somewhat more strongly diverging toward the caudal margin, the median width not more than half that at the caudal margin, the width of the latter equal to slightly more than half of the length of the disk, cephalic and caudal



Figs. 16 and 17.—Outline of left cercus of males (types) of *Dichopetala castanea* (16) and *D. brevisas-tata* (17). ($\times 10$.)

margins of the disk subtruncate, transverse broad V-shaped sulcus placed slightly caudad of the middle, caudad of which sulcus there is laterad on the disk slight indication of another sulcus; lateral lobes with the greatest depth contained nearly twice in the dorsal length of the

same, ventro-cephalic angle subrectangulate, ventral margin moderately sinuato-emarginate cephalad, ventro-caudal angle broadly rounded, caudal margin oblique-truncate, transverse sulcus well impressed dorsad, lateral shoulders slightly indicated in the humeral region. Tegmina very slightly shorter than the dorsal length of the pronotum, the distal extremity slightly surpassing the margin of the proximal abdominal segment, costal margin moderately arcuate, distal margin truncato-arcuate, the lateral angle rounded, sutural margin rotundato-rectangulate at the apex of the stridulating vein, the margin obliquely subtruncate thence to the distal extremity; marginal field narrow, discoidal field expanding from the middle of the tegmen, with a number of irregular areas, stridulating vein nearly transverse, gently arcuate caudad, speculum proper with the greatest length exceeding the greatest width. Abdomen subfusiform; disto-dorsal abdominal segment with the median impressed area transverse and arcuate; supra-anal plate trigonal with a broad median V-shaped emargination; cerci with the proximal portion straight, robust, cylindrical, distal portion tapering, gently curving mesad, the distal fourth straight, spiniform and at a right angle to the thickened proximal portion, tooth placed at the junction of the proximal portion and the tapering section, on the dorsal section of the cercus toward the external face, moderately acute, subdepressed, little divergent dorsad from the general plane of the cercus, not more than a third the length of the distal half of the main cercal shaft; subgenital plate broad, transverse, the greatest width considerably exceeding the length of the plate, lateral margins straight convergent in the proximal two-thirds of their length, thence parallel for a very short distance, the width of the subequal section about half that of the greatest width of the proximal section, distal margin with a V-shaped emargination mesad, this occupying slightly more than a quarter of the median length of the plate, laterad of this emargination the distal margin is nearly truncate, thus forming lateral angles slightly more acute than a rectangle, a moderately distinct median carina present on the ventral surface of the plate. Cephalic femora subequal in length to the head, pronotum and tegmina, very slender; cephalic tibiae distinctly exceeding the femora in length, foramina small, elliptical. Median femora slightly longer than the cephalic femora;



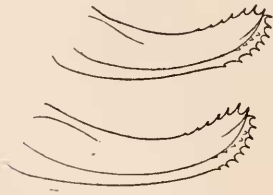
Figs. 18 and 19.—Outline of subgenital plate of males (types) of *Dichopetala castanca* (18) and *D. brevihastata* (19). ($\times 4$.)

median tibiae nearly half again as long as the femora. Caudal femora about a third again as long as the body, moderately inflated in the proximal three-fifths, genicular lobes unispinose; caudal tibiae surpassing the femora by about the length of the pronotum.

Allotype: ♀; Laguna del Gato, three miles west of Sam Fordyce, Hidalgo County, Texas. Elevation 175–200 feet. August 6, 1912. (Rehn and Hebard.) [Hebard Collection.]

Description of Allotype.—Characters not specifically mentioned are not markedly different from the male sex.

Size medium; form moderately robust. Pronotum much less compressed, the median width of the disk of the pronotum contained less than three times in the length of the same. Tegmina much broader than the apparent length, apices hardly surpassing the margin of the metanotum, the distal margin rotundato-truncate, the interspace between the tegmina not more than half the width of a single tegmen; venation irregular. Cerci very short, conoid; ovipositor nearly equal to the length of the head and pronotum together, tapering in the proximal two-thirds, the proximal depth slightly more than a third of the length, moderately



Figs. 20 and 21.—Outline of ovipositor of females (allotypes) of *Dichopetala castanea* (20) and *D. brevihastata* (21). (× 4.)

arcuate, ventral margin appreciably flattened for a portion of its length, dorsal margin more arcuate distad than proximad, apical margins proper slightly more acute than a rectangle, armed on the distal third of the dorsal margin with seven erect teeth, increasing in length distad, ventral margin strongly arcuate distad, armed with nine spines,

the proximal several of which are smaller than the others, the distal ones distinctly recurved; subgenital plate brief, strongly transverse, distal margin obtusely brace-shaped (—) emarginate. Cephalic femora slightly exceeding the combined length of the head, pronotum and tegmina, slightly more robust than in the male. Median femora as robust as the cephalic pair. Caudal femora a fourth again as long as the body (exclusive of the ovipositor), appreciably more robust than in the male, the proximal dilation slightly more extensive.

Paratypic Series.—A paratypic series of five males and eight females from Laguna del Gato has been selected, the measurements of the same being given below.

Measurements (in millimeters).♂♂
Laguna del Gato, Tex.

	(TYPE.)	(Paratypes.)		
Length of body.....	17.7	20.	18.	17.3
Length of pronotum.....	4.2	4.5	4.5	4.3
Greatest width of dorsum of pronotum.....	2.6	3.	2.3	2.5
Length of tegmen.....	3.9	4.	4.	4.
Greatest width of discoidal and anal fields of tegmen.....	3.2	3.3	3.3	3.3
Length of cephalic femur.....	9.2	9.7	9.5	8.5
Length of median femur.....	9.8	10.8	10.	9.2
Length of caudal femur.....	20.	22.	22.	19.6

♀♀
Laguna del Gato, Tex.

	(Allotype.)	(Paratypes.)		
Length of body (exclusive of ovipositor).....	18.7	16.8	18.5	19.
Length of pronotum.....	5.	4.8	5.1	5.2
Greatest width of dorsum of pronotum.....	3.6	3.	3.	3.2
Apparent length of tegmen.....	1.3	1.6	1.4	1.5
Greatest width of tegmen.....	2.7	2.9	2.4	2.3
Length of cephalic femur.....	8.6	8.	8.2	8.2
Length of median femur.....	9.2	8.9	9.	9.
Length of caudal femur.....	21.5	20.	21.	21.2
Length of ovipositor.....	7.2	7.5	7.1	7.5

Measurements of extreme individuals.

	♂ Southwest Texas. (Schaupp) [Hebard Coll.]	♂ Victoria, Tamaulipas, Mex. [Hebard Coll.]	♀ Southwest Texas. (Schaupp) [Hebard Coll.]	♀ Tamo Vera Cruz, Mex. (Bishop) [U. S. N. M.]
Length of body.....	15.	23.5	16.8	21.
Length of pronotum.....	4.	4.7	4.9	6.1
Greatest caudal width of dorsum of pronotum.....	2.6	3.2	3.	4.1
Length of tegmen.....	3.	3.4	1.2	2.7
Greatest width of discoidal and anal fields of (♂), or entire width of (♀) tegmen.....	3.	3.8	2.2	2.8
Length of cephalic femur.....	7.3	9.	7.5	11.
Length of median femur.....	8.	10.	8.3	12.9
Length of caudal femur.....	18.	21.5	20.	29.
Length of ovipositor.....	.....	.....	6.7	10.

The variation in size appears to be purely individual aside from the possible presence of a larger race at the southern extreme of the range of the species. The individuals from Victoria, Tamaulipas, are of peculiar interest in this connection, the pronotum in both sexes being shorter and broader than in the other specimens of the species, while the legs are somewhat thicker and more robust than in by far the greater portion of the Texas series, but their length proportions are matched in other individuals. The tegmina in the Victoria male are shorter and broader than in any other individual of the same sex seen, the distal portion being much less produced with the margin decidedly truncate. The size of the tegmina is seen to vary somewhat in the female sex, the width of the interspace between the two also fluctuating, but the latter is never wide enough to cause any difficulty in determining the species. The Tamos female is unique in its great dimensions, aside from which it is perfectly typical of the species. We doubtless have here parallelism to the condition of sporadic giantism found in the next species, under which the matter is discussed. It is possible that in this case the variation is geographic, but our material from Mexico is too meager to make any definite assertions.

Color Notes.—The following color notes are all based on stuffed specimens, all of which, with the exception of two individuals, were prepared by the authors and have retained in practically its entirety the original coloration.¹⁷

The general pattern of the male has the dorsum of the head, pronotum, and abdomen dark and generally uniform, paired pale lines extending from the caudal margin of the eye, marking the boundaries of the disk of the pronotum, involving the whole marginal field of the tegmina and present as broader lateral bars on the abdomen. The abdominal segments have pale beaded margins caudad, these rarely outlined proximad with blackish. In the male the general color of the venter and of the lateral aspects of the pronotum, pleura, abdomen and proximal portions of the femora vary from honey yellow to parrot green in shade and also considerably in intensity. The color of the dorsum of the head, pronotum, and abdomen in the same sex ranges from clear mahogany red through argus brown to nearly clear pyrite yellow. This color is usually

¹⁷ Three males and eight females listed in the summary of specimens have not been stuffed and are disregarded in the remarks given above. They are all much browner than any of the freshly prepared individuals collected by the authors and in three cases have the color pattern much intensified on the abdomen.

purest on the disk of the pronotum, on the dorsum of the abdomen being solid, bounded by the pale marginal lines on the segments, frequently bisected by an adventitious pale medio-longitudinal line or divided by a broad median area of the lateral color and in the extreme condition only present laterad in the neighborhood of the pale lines. Head of the male with the cephalic and lateral aspects slightly paler than the lateral color, varying from baryta yellow to chalcedony yellow, an infra-ocular bar of indian red frequently present, rarely observed, and then but faintly, in the paler specimens; eyes varying from light buff to seal brown, this apparently due in part to the drying of the insect; antennæ varying from raw sienna to kaiser brown, the proximal joint in greater part of the color of the face. Pronotum of male with the pale lateral lines varying from nearly pure white to buff yellow in one extreme and viridine yellow in the other, always broader cephalad and caudad than mesad, generally severed once and sometimes twice at the point of greatest constriction; lateral lobes of pronotum with a trace of the dorsal color present cephalad and caudad contiguous to the pale bars. Tegmina of the male with the underlying color varying from bay to maroon, the venation and marginal field similar to the pale lateral bars of the pronotum in color; base of the narrow discoidal field entirely suffused with weak mahogany red or bright chestnut, the pale veins of the distal portion of the same field sharply contrasted. Disto-dorsal abdominal segment of the male washed with yellow, varying from pale cadmium to mars yellow, the cerci wholly of the same color. Cephalic and median femora of the male with more or less of their length ochraceous-orange, occasionally green without any of the former color; cephalic and median tibiæ with green the underlying color, more or less suffused with ochraceous-orange or occasionally (Victoria, Tamaulipas, specimens only) almost wholly blackish, the region of the tympanum almost invariably (but a single exception) touched dorsad with blackish. Caudal femora of male with the proximal three-fifths parrot green¹⁸ with a medio-lateral stippled pattern of blackish; distal extremity of femora blackish brown of variable intensity, rarely very weak, remainder of distal two-fifths of the femora varying, with the general tone, from mustard yellow to zinc orange. Caudal tibiæ of male with their ventral color agreeing with the yellowish distal portion of the femora, but dorsad

¹⁸ Even in the specimens with honey-yellow lateral aspects (Victoria, Tamaulipas) the femora are parrot green, which would lead one to the conclusion that green was the natural coloration of the greater portion of the whole insect.

more or less washed with blackish brown, very strongly and decidedly so in the Victoria, Tamaulipas, pair. The type is of a well-contrasted color form only surpassed in intensity by the Victoria individuals.

The stuffed Victoria, Tamaulipas, female is practically a color duplicate of the male from that locality, the following comments being based on the remainder of the stuffed females.

The general pattern of coloration of the females differs from the pattern of the male only in that the pale lateral lines are not indicated on the tegmina and the beaded character of the marginal coloration of the dorsal abdominal segments is less frequent. The lateral and ventral color of the females is, in the stuffed individuals, always green, varying from light yellow-green to parrot green. The dorsal color as indicated in the male is rarely developed at all in the female, and then mostly indicated only on part of the pronotum and extreme lateral sections of the dorsum of the abdomen. A narrow medio-longitudinal line varying from victoria lake to english red is indicated more or less distinctly on a part or all of the pronotum in a portion of the females, while in one specimen the dorsum of the pronotum is weakly suffused with the last-mentioned color. Head of the female colored as in the opposite sex, but antennæ ranging from oil yellow to mars yellow. Pronotum of the female with the lateral lobes colored as in the male; the usual pale lateral lines of the pronotum are subobsolete in about half of the specimens, being indicated on the head in several which have them almost lacking on the pronotum. Tegmina of the female varying from cream white to baryta yellow, the interstices of the dorsal section occasionally slate color, the median section proximad with a variable but always weak narrow line of hay's russet. Abdomen of the female with the lateral pale lines washed with the lateral color as in the male, occasionally very weak, sometimes relatively broad and frequently with the portion on each individual segment roughly elongate trigonal. Ovipositor passing from course green at the base to ivy green at the apex, washed along the dorsal margin with the color of the median line of the dorsum of the pronotum when that line is present; teeth of the ovipositor pitch brown. Limbs of the female varying from a type like that of the majority of the males to one in which they are practically course or light bice green, the pattern of the external face of the caudal femora always, although often very faintly, indicated. The presence of the blackish near the tympanum of the cephalic tibiæ is exceptional and not the rule in the female.

The allotype is about midway between the extremes here de-

scribed, having a short median line on the pronotum, very weak incomplete pale pronotal lines and practically uniform limbs, without blackish near the tympanum of the cephalic tibiae.

The Victoria, Tamaulipas, individuals stand apart from the other specimens, having an intensified pattern surpassing in contrast anything else belonging to the species seen by us. Certain structural peculiarities may compel the separation of these, as a distinct race, at a later date when more Mexican material is accessible, so that the following comments do not include them. The female from Maverick County has a very intensive coloration, with the dorsum of the pronotum and lateral portions of the dorsum of the abdomen suffused with garnet brown. The Laguna del Gato series is as a rule weaker in color contrasts than Uvalde, Del Rio and Mission individuals of both sexes, the type alone excepted. San Antonio specimens stand about intermediate in color intensity. That color is of little geographic significance is shown by the fact that the two lots taken closest together (about eighteen miles apart), *i.e.*, Laguna del Gato and Mission, are nearly as widely divergent as any examined.

Distribution.—The range of this species extends from an undetermined point on the Pecos River, probably near the New Mexican line,¹⁹ east to the vicinity of Corpus Christi and south as far as Tamos, Vera Cruz, Mexico. Aside from the uncertain Pecos record and that from Tamos, the range of the species is approximately co-extensive with the area called the Rio Grande Plain by Bray.²⁰ While the Pecos locality is more elevated, the highest points at which we have noted the species (Del Rio and Uvalde) are at an elevation of 1,100 feet, while the Corpus Christi and Tamos individuals were taken almost at sea-level. It is probable that the Victoria, Tamaulipas, specimens were taken at a higher elevation than 1,100 feet, but we have no definite information to this effect, the general region, however, being near the 500 meter (approximately 1,640 feet) contour. At Mission the species was taken just below the line of gravel hills, while the Laguna del Gato series was taken in these hills. At Del Rio and Uvalde it occurred on the rolling plateau country, while

¹⁹ The data with this specimen is "Pecos, Aug. 18." As the specimen came to Scudder through Uhler, we can, judging by analogy with other specimens similarly credited by Scudder, probably consider it one of Capt. Pope's collecting. Capt. Pope's camps along the Pecos reached from above the New Mexican line to considerably below the same, but the dates were all in March. The specimen is in poor shape, having been dried from a liquid preservative. It is possible, however, that the specimen was taken much later near the present town of Pecos, Texas.

²⁰ *Botan. Gazette*, XXXII, p. 116, fig. 6.

at San Antonio it was taken in the hilly country immediately north of the city. Tamos, the southern limit of the species, is near Tampico, on the Rio Panuco, in the extreme northern part of Vera Cruz.

Biological Notes.—At Laguna del Gato the present species was taken on a low, very green rhamnaceous shrub (probably *Condalia obovata*), where it was common locally. At Mission five individuals were heard at night in bushes, several as much as five feet from the ground. At San Antonio the species was very local, not at all common and hard to find in a low, stout, green rhamnaceous bush. On the hill slopes at Uvalde it occurred on the low *Acacia berlandieri*, which there replaced the ubiquitous mesquite, while at the foot of the hills it was taken on tall rank green weeds. On the Del Rio hills, which were clothed with low *Acacia*, numerous other thorny bushes, occasional arborescent yuccas, and several species of *Opuntia*, the present species was secured in catclaw (*Mimosa* sp.) and other thorny bushes. The specimens taken by Pratt at San Antonio were from *Opuntia lindheimeri*, while at Corpus Christi and in Maverick County it occurred on plants of the same genus.

Synonymy.—The erroneous determination of the species as *brevihastata* by Hunter, Pratt and Mitchell, we have corrected by an examination of the original material.

Remarks.—The most striking diagnostic characters of this species are, the abbreviate subgenital plate of the male and the combination of a short ovipositor and the narrow interspace between the tegmina in the female. The latter space never equals the width, and rarely as much as half the width, of a single tegmen. The male subgenital plate is seen, when compared with that of *brevihastata*, to be broader, not at all produced mesad, except that the plate is in general narrowed in that direction, the distal margin is V-emarginate mesad with slight subtruncate sections laterad, which are flanked at the angles with very short blunt subobsolete tubercles. The cercus has the extremity more acute than in *brevihastata*, also more elongate, with the character of the median tooth slightly different. The ovipositor has the ventral margin straighter, the proximal depth less in proportion to that of the apex and the apex slightly more acute. The more ovate eye is immediately apparent on comparison.

Specimens Examined.—54; 21 males, 33 females.

Pecos. August 18, 1 ♀, [Scudder Coll.].

Del Rio, Valverde Co., Texas, elev. 900–1,100 feet, August 22–23, 1912, (R. and H.), 3 ♂, 1 ♀.

Uvalde, Uvalde Co., Texas, elev. 1,000–1,100 feet, August 21–22, 1912, (R. and H.), 3 ♂; last week of July, 1 ♂, [Scudder Coll.].

San Antonio, Bexar Co., Texas, August 15-16, 1912, (R. and H.), 2 ♂, 5 ♀; October 29, 1905, and June 16, 1908, (F. C. Pratt; on *Opuntia lindheimeri*), 3 ♀, [U. S. N. M.].

Southwest Texas, November, 1884, (Schaupp), 1 ♂, 3 ♀, [Hebard Coll.].

Maverick Co., Texas, May 15, 1906, (J. D. Mitchell; on *Opuntia*), 1 ♀, [U. S. N. M.].

Carrizo Springs, Dimmit Co., Texas, June, 1885, May, 1886. (A. Wadgymar), 1 ♂, 1 ♀, [Hebard Coll.].

Corpus Christi, Nueces Co., Texas, October 20, 1905, (F. C. Pratt), 1 ♂, 1 ♀, [U. S. N. M.].

Ringgold Barracks (now Rio Grande City), Starr Co., Texas, (Schott), 1 ♂, [Scudder Coll.].

Laguna del Gato, Hidalgo Co., Texas, elev. 175-200 feet, August 6, 1912, (R. and H.), 6 ♂, 9 ♀. TYPE, allotype and paratypes.

Mission, Hidalgo Co., Texas, elev. 138 feet, August 5-6, 1912, (R. and H.), 2 ♂, 3 ♀.

Victoria, Tamaulipas, Mexico, July, 1 ♂, 1 ♀, [Hebard Coll.]; December 10, 1909, (F. C. Bishop), 2 ♀, [U. S. N. M.].

Tamos, Vera Cruz, Mexico, December 7, 1909, (F. C. Bishop), 1 ♀, [U. S. N. M.].

***Dichopetala brevihastata* Morse.**

1902. *Dichopetala emarginata* Scudder and Cockerell (not of Brunner, 1878), Proc. Davenport Acad. Sci., IX, p. 51. [Mesilla Park, New Mexico.]

1902. *Dichopetala brevicauda* Scudder (not *Dichopetala brevicauda* Scudder, 1900), *Ibid.*, p. 51, pl. IV, fig. 1. [Riley's Ranch, Mesilla Valley, New Mexico; Mesilla Park, New Mexico; Mexico.]

1902. *Dichopetala brevihastata* Morse, Psyche, IX, p. 381. (To replace *D. brevicauda* Scudder, 1902.)

1907. *Dichopetala brevihastata* Rehn, Proc. Acad. Nat. Sci. Phila., 1907, p. 56. [Carr Canyon, Huachuca Mts., Arizona.]

1907. *Dichopetala laevis* Rehn, *Ibid.*, p. 56, fig. 10. [Carr Canyon, Huachuca Mts., Arizona.]

1909. *Dichopetala brevihastata* Rehn and Hebard, *Ibid.*, 1909, p. 167. [Mouth of Dry Canyon, Sacramento Mts., New Mexico.]

This species needs comparison with no form of the genus except *castanea*, under which species the important differential characters are given.

TYPES: 1 ♂, 2 ♀. Riley's Ranch, Mesilla Valley, New Mexico, August 16 (Cockerell); College campus, Mesilla Park, New Mexico, on *Atriplex canescens*, August 2 (*nec* 7), (Cockerell); Mesilla Park, New Mexico, September 11 (Cockerell).

Single Type here Designated: ♂; College campus, Mesilla Park, Donna Ana County, New Mexico. August 2, 1898. (Cockerell; on *Atriplex canescens*.) [Scudder Collection.]

Description of Type.—Size medium;²¹ form moderately slender; surface subglabrous. Head with the greatest width of the eye contained more than one and one-half times in the length of the same; antennæ²² (in perfect individuals) five times the length of the body. Pronotum with the caudal section of the same equal in width to about two-thirds the length of the disk, transverse V-shaped sulcus placed on the middle of the disk; lateral lobes of the pronotum with the greatest depth contained slightly more than one and one-half times in the dorsal length of the same, cephalic margin of the lateral lobes slightly arcuate, ventro-caudal angle and caudal margin of the lobes moderately arcuate. Tegmina slightly longer than the dorsal length of the pronotum, distal margin obliquely arcuato-truncate, the lateral angle moderately rounded; stridulating vein slightly oblique. Disto-dorsal abdominal segment with a recurved trigonal production which is very deeply V-shaped emar-

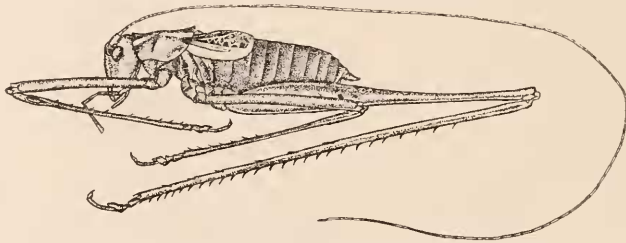


Fig. 22.—*Dichopetala brevihastata* Morse. Lateral view of type. ($\times 2$)

ginate mesad, laterad of which this production is rounded; supra-anal plate trigonal with the apex narrowly truncate; cerci as in *castanea* in the form of the proximal portion and general curve of the distal section, median tooth slightly less divergent dorsad from the main body of the cercus, distal extremity of the cerci moderately produced, caniniform, but not spiniform; subgenital plate longer than the proximal width, lateral margins moderately rect-convergent for the greater portion of their length, thence briefly subparallel, the width of the subequal portion about half of the broad proximal portion, distal margin wholly V-emarginate, only narrowly rounded lobes remaining laterad, a very weak medio-longitudinal carina present ventrad. Cephalic femora proportionately as in *castanea*, but slightly slenderer. Median femora very slender. Caudal limbs as in *castanea*.

Allotype here Selected: ♀; Riley's Ranch, Mesilla Valley, Donna

²¹ On account of the close relationship of this species to *castanea*, only characters showing some difference from those of the latter species are here mentioned.

²² Imperfect in type.

Ana County, New Mexico. August 16, 1898. (Cockerell.) [Scudder Collection.]

Description of Allotype.—Characters not specifically mentioned are not markedly different from those of the male sex or of the female of the closely allied *D. castanea*. Pronotum with the whole form slightly more compressed than in *castanea*. Tegmina small, little broader than the apparent length of the same, reaching the caudal margin of the metanotum, distal margin broadly rotundato-rectangulate, the interspace between the tegmina subequal to the width of a single tegmen. Ovipositor slightly surpassing the length of the head and pronotum together, considerably arcuate, proximal depth distinctly less than a third of the length of the ovipositor, ventral margin moderately arcuate, not at all flattened, dorsal margin very slightly more arcuate distad than proximad, apical margin proper acute-angulate, armed on the distal third of the dorsal margin with seven teeth, ventral margin considerably arcuate distad, armed with nine spines, those of both margins similar to those found in *castanea*; subgenital plate with the lateral angles produced into distinct spiniform lobes equal in length to the main depth of the plate, median emargination of the plate much as in *castanea*. Cephalic femora slightly inferior to the combined length of the head, pronotum and tegmen. Caudal femora slightly longer than the body, appreciably weaker than in *castanea*.

Paratypic Series.—We have examined all three specimens on which Scudder based the species, one being selected as the single type, another as the allotype, the third (Mesilla Park, September 11, Cockerell) remaining as a paratype.

Measurements (in millimeters).

	♂♂		
	Mesilla Park, N. M. (TYPE).	Sycamore Canyon, Pima Co., Ariz.	Average of three; Tunamoc Hill, Pima Co., Ariz.
Length of body.....	15.5 ²³	14.8	13. (12.5-13.6)
Length of pronotum.....	4.3	4.	3.9 (3.8- 4.)
Greatest caudal width of disk of pronotum.....	3.	2.7	2.5 (2.2- 3.)
Length of tegmen.....	4.4	4.2	3.8 (3.5- 4.1)
Greatest width of discoidal and anal fields of teg- men.....	3.5	3.1	2.9 (2.9- 3.)
Length of cephalic femur.....	9.2	10.	8.3 (7.7- 9.2)
Length of median femur.....	10.3	10.8	9. (8. -10.)
Length of caudal femur.....	21.3	22.8	19.1 (17. -21.3)

²³ Scudder's original measurements of this specimen are: body, 14; pronotum, 3.7; $\frac{1}{2}$ cephalic femur, 11; caudal femur, 21. The discrepancy in body length is

	♂ ♂		
	Carr Canyon, Cochise Co., Ariz.	Average of six; Marathon, Brews- ter Co., Tex.	Average of six; Laguna del Gato, Hidalgo Co., Tex.
Length of body.....	13.	15.8 (13.7-17.7)	16.3 (13.8-18.)
Length of pronotum.....	3.9	3.8 (3.6- 4.)	4. (3.9- 4.2)
Greatest caudal width of disk of pronotum.....	2.6	2.5 (2.5- 2.6)	2.5 (2.3- 2.7)
Length of tegmen.....	4.	4.1 (3.9- 4.4)	4. (3.9- 4.5)
Greatest width of discoid- al and anal fields of tegmen.....	3.1	3. (2.9- 3.2)	2.8 (2.7- 3.)
Length of cephalic femur... 9.	8.9 (8.5- 9.5)	9.5 (9.1- 9.9)	
Length of median femur... 9.8	9.4 (9. -10.1)	9.9 (9.1-10.3)	
Length of caudal femur...20.3	19.9 (19.3-20.5)	21. (19.9-22.2)	

♂ ♂

Average of three;
Montelovez, Coahuila,
Mex.

Length of body.....	14.8 (12.8-16.3)
Length of pronotum	4.3 (4. - 4.7)
Greatest caudal width of disk of pronotum	2.8 (2.7- 2.9)
Length of tegmen.....	3.7 (3.4- 4.2)
Greatest width of discoidal and anal fields of tegmen	3.1 (3. - 3.3)
Length of cephalic femur.....	9.6 (8.9-10.)
Length of median femur	10.6 (9.8-11.)
Length of caudal femur	22.5 (21. -23.5)

♀ ♀

Riley's
Ranch, Mesilla Park,
New Mex. New Mex.
(Allotype.) (Paratype.)

Length of body (exclusive of ovipositor).....	20.5	18.3
Length of pronotum.....	5.	6.4
Greatest dorsal width of pronotum.....	3.	3.9
Apparent length of tegmen	1.5	1.4
Greatest width of tegmen	2.	2.1
Length of cephalic femur.....	8.	9.
Length of median femur	8.5	10.5
Length of caudal femur.....	21.5	24.
Length of ovipositor.....	8.2	8.8

probably due to the same being taken from different points, that of the cephalic femur on account of his measurement including the coxa, but the pronotal difference is incomprehensible to us. The only explanation which seems at all likely is that the length was taken along the lateral angles of the disk instead of along the median line, as we are accustomed to take the latter measurement to get the maximum.

	♀ ♀	
	Average of three; Sycamore Canyon, Pima Co., Ariz.	Average of three; Tumamoc Hill, Pima Co., Ariz.
Length of body (exclusive of ovipositor).....	20.7 (20. - 21.5)	21.4 (20.7-22.7)
Length of pronotum.....	5.2 (5. - 5.5)	5.3 (5.1- 5.5)
Greatest dorsal width of pronotum.....	3.1 (3. - 3.2)	3.1 (3. - 3.2)
Apparent length of tegmen.....	1.2 (1. - 1.3)	1.2 (1. - 1.6)
Greatest width of tegmen.....	2. (1.8- 2.2)	2.2 (2.1- 2.6)
Length of cephalic femur.....	8.7 (8.5- 8.9)	9. (8.8- 9.3)
Length of median femur.....	9.9 (9.7-10.)	9.6 (9.2-10.)
Length of caudal femur.....	23. (21.9-23.7)	23.3 (23. -24.1)
Length of ovipositor.....	8.8 (8.7- 9.)	8.6 (8.5- 8.9)

	♀ ♀	
	Average of six; Marathon, Brewster Co., Tex.	
Length of body (exclusive of ovipositor).....	20.2 (17.8-22.)	
Length of pronotum.....	5.3 (5. - 5.8)	
Greatest dorsal width of pronotum.....	3.2 (3.1- 3.5)	
Apparent length of tegmen.....	1.2 (1.1- 1.5)	
Greatest width of tegmen.....	2.1 (2. - 2.2)	
Length of cephalic femur.....	8.9 (8. - 9.7)	
Length of median femur.....	8.9 (8. - 9.7)	
Length of caudal femur.....	22.8 (21.9-24.)	
Length of ovipositor.....	8.7 (7.8- 9.)	

	♀ ♀			
	Uvalde, Uvalde Co., Tex.	Beeville, Bee Co., Tex.	Gregory, San Patricio Co., Tex.	Laredo, Webb Co., Tex.
Length of body.....	21.9	19.	20.2	18.7
Length of pronotum.....	6.	5.4	5.7	5.
Greatest dorsal width of pronotum.....	3.7	3.	3.5	3.5
Apparent length of tegmen.....	1.2	1.7	1.	1.4
Greatest width of tegmen.....	2.5	2.	2.	1.9
Length of cephalic femur.....	10.4	9.	9.1	8.2
Length of median femur.....	12.	10.	10.3	9.2
Length of caudal femur.....	26.7	23.	22.8	21.2
Length of ovipositor.....	9.	8.5	8.5	7.6

	♀ ♀	
	Average of six; Laguna del Gato, Hidalgo Co., Tex.	Average of three; Montelovez, Coahuila, Mex.
Length of body.....	20.5 (18.5-23.)	18.1 (15.3-21.)
Length of pronotum.....	5.6 (5. - 6.)	5.8 (5.2- 6.2)
Greatest dorsal width of pronotum.....	3.4 (3.3- 3.6)	3.5 (3.2- 3.8)

	♀ ♀	
	Average of six; Laguna del Gato, Hidalgo Co., Tex.	Average of three; Montelovez, Coahuila, Mex.
Apparent length of tegmen	1.2 (1.1- 1.5)	1.4 (.8- 1.8)
Greatest width of tegmen	2.2 (2.1- 2.3)	2.4 (2. - 2.7)
Length of cephalic femur	9. (8.7- 9.3)	9.4 (8.8-10.)
Length of median femur	10.2 (9.8-11.)	10.3 (8.7-11.2)
Length of caudal femur	23.3 (22.4-24.7)	24.6 (23.3-26.5)
Length of ovipositor	8.2 (7.7- 8.7)	9.1 (8.6- 9.8)
		♀ ♀
		Average of four; Jaral, Coahuila, Mex.
Length of body		20.8 (20. -21.5)
Length of pronotum		5.3 (5.2- 5.8)
Greatest dorsal width of pronotum		3.3 (3.2- 3.5)
Apparent length of tegmen		1. (.8- 1.1)
Greatest width of tegmen		2.3 (2. - 2.5)
Length of cephalic femur		8.4 (8. - 9.)
Length of median femur		9.3 (9. -10.1)
Length of caudal femur		21.1 (20.6-22.2)
Length of ovipositor		8.1 (8. - 8.3)

From the above measurements it is evident that considerable variation, both geographic and individual, is present in this species. The geographic evidence shows that material from southern Arizona and the elevated portions of western Texas averages smaller than the series from southern Texas (Laguna del Gato) and Coahuila, Mexico, particularly in the femoral length. The Jaral, Coahuila, females are not, however, of the same general proportions as the Montelovez, Coahuila, specimens of that sex, and, although we are unable to locate the latter locality, possibly altitude may be responsible, Jaral being near the four-thousand-foot contour line. It is possible that the character of cover and richness of same may be a factor in determining the amount of geographic variation. The individual variation is considerable in all of the series, but the only really puzzling feature is the occurrence of large females with heavy pronoti. In the Montelovez series these are more numerous (three out of four) than elsewhere, but the paratypic female from Mesilla Park and to a lesser degree the Uvalde specimen are of this type. This point is treated in greater detail under *Remarks*.

*Color Notes.*²⁴—The series of this species exhibits a very considerable

²⁴ The remarks here set forth on color variation have been made entirely from material which has been stuffed or which is considered by the authors to have retained in a great measure the color tones of the living insect.

amount of variation in intensity of color pattern and color tone. The pattern is considerably recessive and intensive in the male, but in the female the recessive extreme is even greater than in the male, although the intensive is not as decided. The normal pattern as found in both sexes is as follows: a dorsal color involving the occiput, fastigium, dorsum of pronotum, and dorsal surface of the abdomen; pale postocular bars extending to the dorsal base of the cerci; a lateral and ventral color involving face, genæ, lateral lobes of pronotum, pleura, and lateral and ventral aspects of abdomen. In intensive individuals the dorsal color is decidedly darker than the lateral and ventral color, in average individuals in part at least so, in recessive individuals nearly (σ^7) or quite (φ) similar in tone. Strongly intensive individuals generally have the distal extremity of the caudal femora infuscate, but this is not a rule, as occasionally average and rarely moderately recessive individuals have this marking present.

Male. Dorsal color ranging from ochraceous tawny and sudan brown to claret brown and maroon, solid and uniform on head and pronotum, generally restricted to the lateral sections of the dorsum of the abdomen and in intensive individuals blackish next to the pale lateral lines, the distal margins of the abdominal segments edged with the pale color of the lateral bars, this edging subobsolete in the recessive specimens and narrowing mesad in all, a more or less distinct dark beading characterizing the same margins. Pale lateral bars ranging from cream white to very pale orange yellow always indicated in the male. Lateral and ventral color ranging from cream buff and pinkish*buff to brownish olive, the green complimentary phase ranging to civette green. Face in the extreme green condition with broad paired vertical bars of the pale color of the lateral bars placed ventrad of the eyes and antennal bases, the median pair weakly continued to the clypeus; eyes varying from cameo brown to bay; antennæ varying from raw sienna and mars yellow to madder brown, weaker distad. Lateral lobes of the pronotum with a broad margin of the pale lateral color on the ventral and greater portion of the caudal margin, the dorsal section of the lateral lobes washed more or less with the dorsal color; pale paired lines more or less severed at the median sulcus. Tegmina with the marginal field of the color of the pale lines; region of the humeral trunk varying from orange rufous to morocco red; remainder of tegmina with the base color blackish brown, the venation of the same tones as the pale lines. Limbs of the lateral color more or less washed with the dorsal color, in intensive individuals decidedly so, the blackish-brown infuscation

of the distal extremity of the caudal femora (when present) being generally correlated with a similar infuscation of the dorsal face of the caudal tibiæ, the caudal femora, which are infusate distad, having the adjacent section of the distal half more or less inclined toward tawny or yellow ochre. Pattern of caudal femora always present.

Female. Dorsal surface varying from being concolorous with the lateral color through buffy citrine to russet, the intensive type having the abdominal coloration largely produced by stippings. The segments of the abdomen in these contrasted specimens are marked as in the male, but with decided blackish lateral patches which extend more or less toward the median line proximad on each segment. Color of the pale lines (when present) varying from cream white to pale lumiere green and warm buff. Lateral color varying from clay color (in this specimen pale chalcedony yellow on head and pronotum) through course green to hellebore green, the extreme recessive green condition being without distinct pale margins to the lateral lobes and having the whole coloration uniform except for a darkening of the distal margins of the ovipositor. Eyes and antennæ as in the male. Limbs varying as in the male, but in the recessive green type uniform with the general coloration and with the paginal pattern weak. Tegmina varying from a type nearly uniform with the lateral color, to one with the costal and distal margins of the color of the pale lines, humeral trunk claret brown and remainder blackish brown with pale venation. Ovipositor varying from uniform with mass color (recessive green and brown types) with margins edged distad with clove brown to blackish brown to elm green washed dorsad with hazel and teeth blackish (extreme intensive type).

Geographically considered, the coloration of the species shows plasticity in some localities and constancy in others. The Arizona and New Mexico individuals are all more or less recessive, the large Laguna del Gato series decidedly so, while the Marathon series is about evenly divided (recessive, intermediate, and intensive). The five Garden Springs adults are chiefly intensive, as are four of the five Kent individuals. The Uvalde and Laredo specimens are recessive, while the Beeville and Gregory representatives are average. The Montelovez and Jaral individuals are almost all intensively colored.

From the basis of the Arizona, Marathon, Kent, Garden Springs, and Laguna del Gato series it seems possible that direct and reflected

light may be a factor in determining the intensity of the color pattern, the percentage of intensive specimens being greatest from those localities known to us where the cover is densest, more light resistant and the surface conditions less favorable for reflecting light.

Distribution.—This species has the widest distribution of any in the genus, its range extending from southern New Mexico (Sacramento Mts.), south to southern Coahuila, Mexico (Jaral), west to the Baboquivari Mts., central southern Arizona, and east to the Texas coast at Gregory (San Patricio Co.). Its vertical range is from practically sea-level at the last-mentioned locality to as high as 4,800 feet in the Sacramento Mountains. Its zonal range appears to be entirely Lower Sonoran. As far as known, it does not extend into the region of the Edwards Plateau in central Texas and does not occur in the mountains of Trans-Pecos, Texas. Scudder in his original description stated that he had specimens from Mexico, this probably referring to the Montelovez specimens examined by us, as these were contained in his collection.

Biological Notes.—The present species was fairly numerous on creosote-bush (*Covillea tridentata*) at Dry Canyon, Sacramento Mountains, New Mexico, and occurred on the same plant on Tumamoc Hill, Arizona, while at the latter locality it was also found on the ground in short, dry, yellow grass. On the slopes of Sycamore Canyon, Baboquivari Mountains, Arizona, it also occurred in grasses and was taken from *Acacia* sp. At Marathon, Texas, it was generally common in various low bushes and grasses, the males, particularly, often sprawled out in a loose manner somewhat reminding one of phalangids or harvest-men, while at Kent and Garden Springs it occurred in similar situations. At Beeville and Uvalde it was taken from green weedy plants, at Gregory it was found in the green tangle about a mesquite clump, while it was beaten from a low bush on a sandy slope at Laredo. At Laguna del Gato it was taken rather commonly with *D. castanea* on a low, very green rhamnaceous shrub (probably *Condalia obovata*).

A correlation of the dates on the present series brings out some very interesting points on the time of maturity of the species. The earliest dates on which adults were secured are July 28 at Beeville, July 30 at Gregory, August 6 at Laguna del Gato, August 7 at Mesilla, August 10–12 at Laredo, and August 16 at Mesilla. At Dry Canyon, New Mexico (elevation 4,800 feet), on July 13 nymphs not more than half grown were not uncommon, while at Marathon and Garden Springs on August 26–27 and September 2, respectively, nothing but

nymphs were seen, while on September 11 both nymphs and adults were taken at Garden Springs, and adults outnumbered the nymphs at Marathon on September 12-13. From this it is apparent that in the low, warmer Rio Grande Plain and interior valleys (Mesilla) the species matures at least a month earlier than in the higher regions of the plateau. The latest date is November 1-3 at Jaral, Coahuila.

Morphological Notes.—The subgenital plate of the male varies in the depth of the emargination of the distal margin and also in the degree of acuteness of the flanking angles of the same, in some examples these latter being quite acute and in others appreciably rounded. The ovipositor varies slightly, almost inappreciably, in general curvature of the margins and little in length, but the relative depth varies very decidedly, particularly in all of the Mexican specimens, which, however, are almost or quite equalled in this respect by individuals of the sex from Kent and Garden Springs. The lateral angles of the subgenital plate of the female vary in the degree of angulation, in one extreme being practically rectangulate, in the other with subspiniform extremities. While this latter variation is frequently correlated with that in the depth of the ovipositor, the rectangulate type with the deeper ovipositor, the more spiniform type with the narrower ovipositor, this relationship is not at all absolute.

Synonymy.—By an unfortunate lapse, Scudder, when originally describing this species, applied to it the same name (*Dichopetala brevicauda*) that he had given two years previously to a species now known to belong to the genus *Arethaea*, as explained by Morse who renamed the present form. The name *brevihastata*, proposed by Morse to replace the preoccupied *brevicauda*, cannot, in our opinion, be credited to Scudder, notwithstanding Morse's statement that the name was suggested by him, as the note is entirely by Morse without a direct quotation from Scudder. The naming of a species by proxy does not seem possible under present-day rules. In the same paper in which the last *D. brevicauda* was described, Scudder and Cockerell recorded *D. emarginata* from Mesilla Park on *Atriplex*, a locality and situation from which they, a few lines below, described *brevicauda*. There are no specimens in the Scudder Collection labelled *emarginata* from Mesilla Park or in the National Museum, and Prof. Cockerell can give me no additional information. In view of these facts and also that true *emarginata* is not found within hundreds of miles of that locality, as far as known only *brevihastata* occurring in that region, it seems perfectly logical to assume that the determination

of Mesilla material as belonging to two species is due to a compilation of determinations made at different times, one before the recognition of *brevihastata*, and that both records relate to the same species.

The species *D. levis*, erected by the senior author on a single female, is a synonym of the present species. The peculiarities of the ovipositor of the type of *levis*, the unarmed margins of which suggested the specific name, we now know are due to the immaturity of the individual. The latter is in the stage immediately preceding maturity and its proper relationship to the other material now in hand is very evident. The more robust character of the limbs and smaller size of the type of *levis* are similarly explained.

Remarks.—The variation in the length of the pronotum as found in certain females has been touched upon above under the measurements, this being the most decided fluctuation from the more general type found in the species. After considerable study and consideration from different view points, we have concluded that this phase cannot be separated from the more typical one of *brevihastata*, that it is a fluctuation occurring anywhere in the range of the species, although more numerous in certain regions than in others, and is approached by a few specimens not typical of the same and again not exactly similar to the type of *brevihastata*. There is, of course, a possibility that future work may show the advisability of recognizing the larger pronotum type as distinct, but we do not feel that the necessary evidence will be forthcoming.

Specimens Examined.—103; 47 males, 46 females, 4 male nymphs, 6 female nymphs.

Sycamore Canyon, Baboquivari Mts., Pima Co., Arizona, elev. 3,700–4,700 feet, October 6–9, 1910, (R. and H.), 2 ♂, 3 ♀.

Tumamoc Hill, Tucson Mts., Pima Co., Arizona, elev. 2,400–3,092 feet, October 3–4, 1910, (R. and H.), 3 ♂, 3 ♀.

Carr Canyon, Huachuca Mts., Cochise Co., Arizona, August, 1905, (H. Skinner), 1 ♂, 1 ♀ nymph. TYPE (♀ n.) of *D. levis*, [A. N. S. P.].

Riley's Ranch, Mesilla Valley, New Mexico, August 16, (Cockerell), 1 ♂. TYPE, [Scudder Coll.].

Mesilla Park, New Mexico, August 7 and September 11, (Cockerell), 2 ♀. Allotype and paratype, [Scudder Coll.].

Dry Canyon, Sacramento Mts., Otero Co., New Mexico, elev. 4,800 feet, July 13, 1907, (R. and H.), 1 ♀ nymph.

Marathon, Brewster Co., Texas, elev. 3,900–4,160 feet, August 26–27 and September 12–13, 1912, (R. and H.), 16 ♂, 14 ♀, 2 ♂ and 2 ♀ nymphs.

Garden Spring, Brewster Co., Texas, September 2 and 11, 1912, (R. and H.), 3 ♂, 2 ♀, 2 ♀ nymphs.

Kent, Culberson Co., Texas, elev. 3,900-4,200 feet, September 17-18, 1912, (R. and H.), 3 ♂, 2 ♀.

Uvalde, Uvalde Co., Texas, elev. 1,000-1,100 feet, August 21-22, 1912, (R. and H.), 1 ♀.

Beeville, Bee Co., Texas, July 28, 1912, (R. and H.), 1 ♀.

Laredo, Webb Co., Texas, elev. 500-550 feet, August 10 and 12, 1912, (R. and H.), 1 ♂, 1 ♀.

Gregory, San Patricio Co., Texas, July 30, 1912, (H.), 1 ♀.

Laguna del Gato, three miles west of Sam Fordyce, Hidalgo Co., Texas, elev. 175-200 feet, August 6, 1912, (R. and H.), 11 ♂, 8 ♀, 1 ♂ and 1 ♀ nymph.

Montelovez, Coahuila, Mexico, September 20, (Palmer), 6 ♂, 4 ♀, [Scudder Coll. and U. S. N. M.].

Jaral, Coahuila, Mexico, November 1-3, 1909, (J. Friesser), 4 ♀, [Field Museum of Natural History].

***Dichopetala gladiator* n. sp.**

1901. *Dichopetala emarginata* Rehn (not of Brunner), Trans. Amer. Entom. Soc., XXVII, p. 335. [Texas.]

1912. *Dichopetala emarginata* Hunter, Pratt and Mitchell (not of Brunner), Bull. 113, Bureau of Entom., U. S. Dept. of Agric., p. 50. [Hebbronville, Texas.]

1912. *Dichopetala brevihastata* Hunter, Pratt and Mitchell (not of Morse), *Ibid.*, p. 50. (Part) [Alice, Texas.]

The present form is closely related to the following species, *D. emarginata* Brunner, from which, however, it can easily be separated by the more ample tegmina of the male, the more longitudinal lateral lobes of the pronotum of the same sex, the less crassate tooth to the male cercus, the less deeply and sharply angulato-emarginate apex of the subgenital plate of the same sex, the proportionately longer limbs of both sexes and the much longer, slenderer, and more arcuate ovipositor.

TYPE: ♂; Lyford, Cameron County, Texas. August 6-7, 1912. (Rehn and Hebard.) [Hebard Collection.]

Description of Type.—Size rather large; form moderately elongate. Head with the occiput but little declivent to the fastigium and antennal scrobes; fastigium moderately compressed, sublamellate at the apex, subsulcate proximad, extremity partially in contact with facial fastigium; eyes prominent, ovate, their depth contained one and one-third times in that of the infra-ocular portion of the genæ; antennæ with the proximal joints rounded, very long, over four times as long as the body. Pronotum subsellate, the dorsum

bisinate when seen from the lateral aspect; disk of the pronotum very narrow mesad, the median width about half the caudal width of the same; lateral margins of the disk regularly converging to the middle of the same, thence regularly diverging caudad, indicated caudad by a rounded angle, but elsewhere by color only, in section the cephalic portion of the disk is arcuate, the caudal section deplanate; cephalic margin of disk truncate, caudal margin of same gently arcuate, distinctly elevated; transverse sulcus V-shaped, obliquely

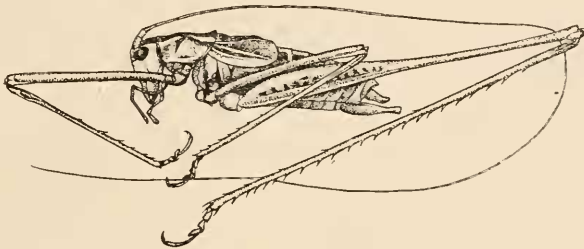


Fig. 23.—*Dichopetala gladiator* n. sp. Lateral view of type. ($\times 2$.)

severing the margins of the disk mesad, on the lateral lobes extending considerably ventrad; lateral lobes with the greatest depth contained twice in the dorsal length of the same, cephalic margin subtruncate, ventro-cephalic angle rotundato-rectangulate, ventral margin arcuato-sinuate, slightly emarginate cephalad, ventro-caudal angle and caudal margin gently arcuate, dorsad rounding into the caudal margin of the disk, the surface of the lobes strongly drawn in to the



Figs. 24 and 25.—Outline of left cercus of topotype of *Dichopetala emarginata* (24) and type of *D. gladiator* (25). ($\times 10$.)

lateral margins of the disk. Tegmina slightly longer than the disk of the pronotum, greatest width of the discoidal and anal fields of the tegmina subequal to the length of the anal field; costal margin moderately arcuate, distal margin obliquely arcuato-truncate, disto-caudal (literally apical) angle well rounded, sutural margin arcuate-obtuse-angulate, slightly sinuate distad of the extremity of the stridulating vein; marginal field moderately broad, discoidal field

not particularly broad, expanding distad, anal vein moderately arcuate, stridulating vein strongly arcuate proximad, straight distad, tympanum proper rather large, subtrigonal. Abdomen with the disto-dorsal abdominal segment having the margin sinuately arcuato-truncate, moderately arcuato-emarginate laterad; supra-anal plate tongue-shaped; cerci regularly arcuate inwards, the proximal portion of the shaft rather heavy, somewhat tapering, median lobe placed on the dorsal surface, short, depressed, slightly concave ventrad, when seen from the dorsum with the external margin arcuate, internal margin straighter, distal extremity of the lobe weakly subtruncate, the lobe narrowing along the same lines as the proximal portion of the shaft of the cercus, distal portion of shaft more sharply arcuate, subdepressed, acute subaciculate, the distal portion (distad of tooth) subequal in length to the proximal portion; subgenital plate moderately produced, elongate, lateral margins moderately converging on median half, subparallel on distal fourth, distal margin with a V-shaped median emargination which occupies not more than



Figs. 26 and 27.—Ventral outline of subgenital plate of topotype of *Dichopetala emarginata* (26) and type of *D. gladiator* (27). ($\times 4$)

one-half of the margin, laterad of the emargination subtruncate, distal portion of the ventral surface of plate tricarinate, mesad and laterad, the lateral carinae following the lines of the distal fourth of the lateral margins, the oblique portion of the lateral margins thickened and subcarinate. Cephalic femora about two and one-half times the length of the disk of the pronotum; cephalic tibiae with the foramina elliptical. Median femora but slightly less than twice the length of the head and pronotum. Caudal femora nearly one and one-half times the length of the body, moderately inflated in proximal half.

Allotype: ♀; Same data as the type.

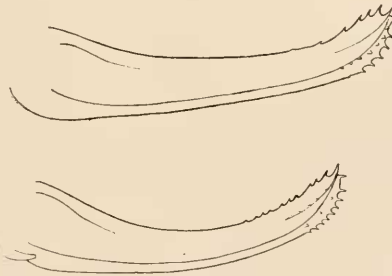
Description of Allotype.—The following characters are those of difference from the type. Size large; form moderately robust. Head with eyes slightly less prominent and more elliptical than in the male, their depth contained one and one-half times in that of the infra-ocular portion of the genae. Pronotum with the disk less deplanate than in the male and nearly straight when seen from the

lateral aspect, form of disk similar to that of male but less constricted mesad; cephalic margin emarginato-truncate, caudal margin moderately arcuate; lateral lobes with their greatest depth contained slightly less than twice in the dorsal length of the same, margins of the lateral lobes as in the male. Tegmina semi-ovate, reaching the caudal margin of the metazona, the greatest width distinctly greater than the apparent length, interspace between the tegmina about



Figs. 28 and 29.—Dorsal outline of head, pronotum, and tegmina of topotype of *Dichopetala emarginata* (28) and allotype of *D. gladiator* (29). ($\times 2$.)

two-thirds that of a single tegmen. Cerci brief, conical, acute; ovipositor subequal to the median femora in length, arcuate in general form, moderately slender, tapering in proximal two-thirds, ventral margin less arcuate than the dorsal one aside from a decidedly arcuate distal portion, distal third of dorsal margin with eleven to twelve teeth increasing in size distad, ventral margin with nine to ten teeth on distal fifth, the extreme distal one slightly recurved; sub-



Figs. 30 and 31.—Outline of ovipositor of topotype of *Dichopetala emarginata* (30) and allotype of *D. gladiator* (31). ($\times 4$.)

genital plate almost divided to the base by a V-shaped emargination, the lateral sections developed into very acute trigonal lobes. Cephalic femora slightly less than twice as long as the disk of the pronotum. Median femora twice the length of the disk of the pronotum. Caudal femora almost two and one-half times the length of the cephalic femora.

Paratypic Series.—We have before us a paratypic series of twenty-three males and twenty females from the type locality—Lyford, Cameron County, Texas.

Measurements (in millimeters).

	Lyford. (TYPE)	Average and extremes of six Lyford spec. (Type and Paratypes)
Length of body.....	16.1	16.7 (15.9–17.8)
Length of pronotum.....	4.5	4.4 (4.2– 4.6)
Greatest dorsal width of disk of pronotum.....	2.6	2.7 (2.5– 3.)
Length of tegmen.....	4.6	4.4 (4.3– 4.8)
Greatest width of discoidal and anal fields of tegmen.....	3.5	3.4 (3.2– 3.5)
Length of cephalic femur.....	10.3	10.4 (10. –10.9)
Length of median femur.....	11.1	11.1 (10.8–11.4)
Length of caudal femur.....	23.3	23.3 (22.8–23.8)

♂ ♂

	Cotulla. [U. S. N. M.]	Wades. [U. S. N. M.]	Carrizo Springs. [Hebard Coll.]
Length of body.....	17.4	17.	16.2
Length of pronotum.....	4.8	4.7	4.7
Greatest dorsal width of disk of pro- notum.....	2.9	2.4	2.9
Length of tegmen.....	4.1	4.	4.4
Greatest width of discoidal and anal fields of tegmen.....	3.2	3.4	3.2
Length of cephalic femur.....	10.2	9.2	9.7
Length of median femur.....	11.2	10.	10.3
Length of caudal femur.....	23.2	22.5	22.5

♀ ♀

	Lyford. (Allotype)	Average and extremes of six Lyford spec. (Allotype and Paratypes)
Length of body (exclusive of ovipositor).....	22.	21.9 (20.2–22.6)
Length of pronotum.....	5.7	5.9 (5.6– 6.3)
Greatest dorsal width of disk of pronotum.....	3.1	3.3 (3.1– 3.6)
Apparent length of tegmen.....	1.4	1.4 (1.2– 1.7)
Greatest width of tegmen.....	2.1	2.2 (2.1– 2.3)
Length of cephalic femur.....	10.5	10.8 (10.3–11.1)
Length of median femur.....	11.3	12. (11.3–12.7)
Length of caudal femur.....	27.	27.4 (25.5–28.5)
Length of ovipositor.....	11.2	11. (10. –11.8)

	♀ ♀ Carrizo Springs. [Hebard Coll.]		
Length of body (exclusive of ovipositor).....	20.5	18. .	20.8
Length of pronotum.....	6.8	6.2	6.5
Greatest dorsal width of disk of pronotum.....	3.7	3.4	3.7
Apparent length of tegmen.....	1.7	1.6	1.
Greatest width of tegmen.....	2.6	2.4	2.3
Length of cephalic femur.....	11.3	10.3	.....
Length of median femur.....	.....	11.6	.....
Length of caudal femur.....	28.	26.2	25.7
Length of ovipositor.....	15.4	14.5	14.5

Males from Wades, Cotulla, and Carrizo Springs have the pronotum slightly longer, tegmina slightly shorter, and femora very slightly shorter than Lyford males. Females from Carrizo Springs have the general size slightly less, the pronotum appreciably longer and ovipositor distinctly longer than in Lyford individuals of the same sex. The most striking variation in measurements is in the length of the ovipositor, which varies geographically more than individually, the Carrizo Springs females having this actually and proportionately far exceeding the measurement of the Lyford specimens.

Color Notes.—The following notes have been based wholly on material which was stuffed in the field or which we have every reason to believe has retained its original coloration. The recessive and intensive extremes are considerably different—in fact, decidedly different in the male sex. Instead of describing a dorsal and lateral color, it seems best in the present species to speak of the tones as a general color, a pronotal wash, a pale pattern, and an abdominal infuscation.

General color of male varying from cinnamon buff to yellow ochre, passing in certain individuals to apple green. The pronotal wash varies from uniform with the general color through sanford's brown to claret brown, the area covered by the same consisting of the occiput, disk of the pronotum, more or less of the dorso-cephalic and dorso-caudal portions of the lateral lobes of the same, the tegminal humeral trunk and more or less of the discoidal field and vicinity of the anal vein of the tegmina. The pale pattern consists of the usual postocular bars outlining the disk of the pronotum, the greater portion of the margins of the lateral lobes, the marginal field of the tegmina, paired lateral bars on the abdomen, transverse edgings on

the segments of the same, and an adventitious medio-longitudinal abdominal thread. The tone of this pattern varies from barita yellow (in the recessive extreme where it is very poorly contrasted) to buff yellow, in the generally greenish individuals running to whitish with the transverse edgings of the abdominal segments cendre green. The abdominal infuscation varies in intensity with the general condition of the coloration, in the extreme recessive condition being absent and in the other extreme covering the entire dorsum of the abdomen (except for the medio-longitudinal thread) and the dorsal portion of the lateral faces of the same, between which types are regular graduations in the dorsal width of this shade, the lateral patches decreasing in size toward the average and recessive condition. The tone of this infuscation is always blackish. Eyes varying from terra cotta to vandyke brown; antennæ lightly more intense than the general color. Pronotum with the pale borders of the lateral lobes somewhat variable in width. Tegmina with the greater portion of the anal field and much of the discoidal field with the base color varying from wood brown to seal brown, the venation and a large proximal patch on the anal field varying from sulphine yellow to raw sienna, frequently more or less washed with greenish. Abdomen with a dorsal medio-longitudinal bar of from sulphine yellow to antique brown in those specimens approaching the intensive extreme which have the dorsum of the abdomen not solidly infumate, the medio-longitudinal thread of the pale pattern of course dividing this bar; segments with the pale pattern edging narrowing mesad, broadest where they bisect the lateral bars of the same pattern, in the intensive extreme a suggestion of beading of the same margin is due to the breaking of the pigment into regular though subcontiguous patches; disto-dorsal abdominal segment varying from deep chrome to sanford's brown; cerci and subgenital plate ranging from deep chrome to orange rufous. Cephalic and median limbs of the general color, more or less suffused with orange rufous distad on the femora and all of the tibiae, the latter in the intensive condition becoming blackish brown distad. In one of the recessive specimens the cephalic and median femora are dusky olive green distad. Caudal femora of the general color, pattern always distinctly indicated, the distal extremity always with a blackish area occupying about one-seventh the femoral length, the distal half otherwise varying from light orange yellow to mars yellow, passing into the color of the proximal half; caudal tibiae more or less deeply and almost wholly suffused with blackish brown, with a brief genicular section of the general color.

Female with the general color varying from sulphine yellow to cosse green, the dorsum of the abdomen in intensive individuals ranging to dilute raw sienna. The pronotal wash is only indicated in the extreme intensive condition, never as extensive as in the male and only solid on the occiput and the cephalic half of the pronotal disk. Pale pattern in the extreme recessive type but faintly indicated on the head and pronotum, in the extreme intensive condition much as in the male, but the transverse edgings to the abdominal segments are narrower and decidedly beaded by blackish intervals. Marginal field of tegmina always solidly whitish. Abdominal infuscation represented only in intensive specimens by blackish areas of variable size placed dorso-laterad at the bases of the segments. Antennæ varying from apricot yellow to ochraceous orange. Ovipositor of the general color, strongly olive green distad, edged there with blackish brown, the dorsal margin of proximal half washed with raw sienna. Limbs of general color, in the intensive extreme approaching viridian green proximad on caudal femora, distad on same sulphine yellow, distal infuscation usually present only in the intensive individuals;²⁵ tibiæ of the general color, distal extremity of the same and tarsi touched with buffy brown.

The type is an average male, while the allotype is an extremely intensive female. In the Lyford series we have both extremes in both sexes and every intermediate, so it is evident that the color variation has no geographic significance.

Distribution.—This large species is known from seven localities in the Rio Grande Plain of Texas (*vide* Bray), its range extending east to Corpus Christi, south to Lyford, north to Wades and Cotulla, and northwest to Carrizo Springs. Its distribution probably extends south of the Rio Grande into Mexico, but we have no material from that country. Its vertical distribution is limited, extending from or near sea-level at Corpus Christi and Lyford to about seven hundred and fifty feet at Carrizo Springs.

Biological Notes.—The present species, from data on the specimens, was taken on cotton at San Diego (nymphal individuals) and on prickly pear (*Opuntia*) at Hebronville and Alice. At Lyford we found the species fairly common but somewhat local in fields of high weeds, which had a low cover of sand spur (*Cenchrus*) and grasses. Its stridulation, which was heard at night and with the aid of which specimens were taken, is very faint.

²⁵ One exception, a recessive female from Lyford has them indicated.

The material from San Diego taken April 30 is all nymphal, while at Carrizo Springs nymphs were taken in May and adults only in June. At Wades and Cotulla adults were taken May 21 and 12, respectively, while at Lyford, August 6-7, but a few nymphs were secured, although the adults were numerous. At Hebronville the species was pairing August 29.

Morphological Notes.—In the male there is some variation in the relative size of the tegmina and some slight differences in the character of the margin of the median lobe of the cerci, but the variation in the genitalia of that sex, including the distal margin of the subgenital plate, is extremely slight. The really noteworthy feature in the form variation is that of the ovipositor, as it varies some in form as well as dimensions. The even curve of the latter is appreciably flattened mesad in certain individuals. This latter condition, however, is never decided enough to cause the ventral margin to appear wholly or in part straight. The caudal margin of the disk of the pronotum varies in the female from truncate to slightly but distinctly arcuate.

Synonymy.—The misidentifications of this species, first as *D. emarginata* by Rehn in 1901, and second by Hunter, Pratt and Mitchell in 1912 as *D. emarginata* and in part as *brevihastata*, we are able to correct, having the material before us. The first error can be explained by the absence of any material for comparison of the closely allied *emarginata*, while the same reason was doubtless responsible for its determination as *brevihastata*, only female individuals having been at hand, aside from an alcoholic male from Hebronville.

Remarks.—There exists a possibility that the acquisition of more material from the western part of the range of the species may make desirable the separation of a western race based on the more elongate ovipositor, but our present representation is too limited to convince us of the desirability of that action. This form is complementary to *D. emarginata*, living in the main in a different region although in much the same situations.

Specimens Examined.—65; 29 males, 29 females, 3 male nymphs, 4 female nymphs.

Lyford, Cameron Co., Texas, August 6-7, 1912, (R. and H.), 24 ♂, 21 ♀, 3 ♀ nymphs. TYPE, allotype and paratypes.

Corpus Christi, Nueces Co., Texas, July 29, 1912, (H.), 1 ♀ nymph; October 20, 1905, (F. C. Pratt), 2 ♀, [U. S. N. M.].

Wades, Nueces Co., Texas, May 21, (E. A. Schwarz), 1 ♂, [U. S. N. M.].

Alice, Nueces Co., Texas, August 28, 1908, (J. D. Mitchell; on *Opuntia*), 1 ♀, [U. S. N. M.].

San Diego, Duval Co., Texas, April 30, (E. A. Schwarz; on cotton), 2 ♂ nymphs, [U. S. N. M.].

Hebbronville, Duval Co., Texas, August 29, 1908; on *Opuntia*, 1 ♂, 1 ♀, [U. S. N. M.].

Cotulla, La Salle Co., Texas, May 12, 1906, (F. C. Pratt), 1 ♂, [U. S. N. M.].

Carrizo Springs, Dimmit Co., Texas, May and June, 1885, (A. Wadgymer), 2 ♂, 3 ♀, 1 ♂ nymph, [Hebard Collection].

Texas, 1 ♀, [A. N. S. P.].

***Dichopetala emarginata* Brunner.**

1878. *D[ichopetala] emarginata* Brunner, Monogr. der Phaneropt., p. 77, [Texas.]

1897. *Dichopetala emarginata* Saussure and Pictet, Biol. Cent.-Amer., Orth., 1, p. 315. [Texas.]

This species constitutes with *D. gladiator* (*vide supra*) a section of the genus readily recognized by genital characters of both sexes. These characters are emphasized in the keys, and in the foregoing description of *gladiator* the differential features of the two forms are also given.

TYPES: ♂ and ♀; Texas. [Brunner Collection and Geneva Museum.²⁶]

Description of Male (Dallas, Texas; U. S. N. M.).—Size medium; form as usual in the genus. Head with occiput moderately declivent; fastigium moderately compressed, low, subcontiguous with the facial fastigium; eyes moderately prominent, ovate, greatest depth contained one and one-third times in the greatest depth of the infra-ocular portion of the genæ; antennæ with proximal joints not depressed. Pronotum not sellate, dorsum subdeplanate, on cephalic half slightly rounding laterad; disk with lateral margins slightly indicated by angles caudad, by color for their whole length, decided and regularly narrowed mesad, the median width about one-half that of the caudal margin of the disk; cephalic margin of disk truncate, caudal margin of same considerably arcuate, slightly flattened mesad; transverse sulcus bisecting the lateral margins of the disk mesad, on the disk forming an obomegoid figure caudad of the middle; lateral lobes of the pronotum with the greatest depth contained

²⁶ From the information given by Saussure and Pictet we learn that this material, or at least the portion of it in the Geneva Museum, was collected by Boll. We have examined fourteen specimens collected by Boll at Dallas, so we consider Dallas material typical.

about twice in the dorsal length of the same, cephalic margin of lobes straight, ventro-cephalic angles narrowly rotundato-subrectangulate, ventral margin very slightly oblique, sinuato-truncate, ventro-caudal angle roundly obtuse-angulate, caudal margin obliquely arcuato-truncate, the dorsal portion of the margin passing into the arcuation of the caudal margin of the disk. Tegmina over three-fourths the length of the disk, the greatest width of the discoidal and anal fields little inferior to the tegminal length; costal margins moderately arcuate, rounding into the slightly oblique subtruncate distal margin, sutural margin subrectangulate, the angle at the extremity of the stridulating vein broadly rounded, the distal section of the same margin slightly sinuate; marginal field narrow, discoidal field regularly expanding distad; anal vein arcuate, anal field with its greatest length subequal to its greatest width, stridulating vein decidedly arcuate, tympanum proper poorly developed. Disto-

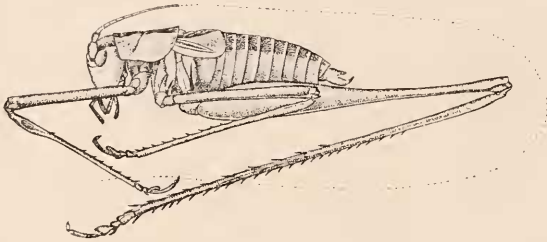


Fig. 32.—*Dichopetala emarginata* Brunner. Lateral view of male topotype. ($\times 2$.)

dorsal abdominal segment with the margin truncate distad; supra-anal plate trigonal, acute, the lateral margins of same slightly arcuate; cerci with the proximal portion moderately robust, slightly flattened dorsad, median lobe placed on dorsal surface, depressed, broad, when viewed from the dorsum the margin of the lobe is broadly rounded on the external and bluntly angulate on the internal side, shaft proper arcuate inwards from proximad of middle, tapering, acute, subaciculate, slightly curved dorsad; subgenital plate with proximal width slightly less than greatest length, moderately produced, distal half with margins converging for the greater portion of their length, then subparallel, distal margin rectangulate emarginate, the lateral angles very faintly blunted, ventral surface weakly tricarinate distad. Cephalic femora somewhat shorter than the combined length of the head, pronotum and tegmina; foramina of cephalic tibiae elongate elliptical. Median femora slightly exceeding the combined length of head, pronotum, and tegmina. Caudal femora slightly more than

twice the length of the median femora, considerably robust in the proximal three-fifths.

Description of Female (Dallas, Texas; U. S. N. M.).—The following points are those of difference from the male. Size rather large. Eyes slightly more elliptical than in the male; proximal antennal joints slightly deplanate. Pronotum with the lateral margins of disk marked nowhere by angles and only indicated by color, shape of color margins as in male, but median width slightly more than half the caudal width of the disk; lateral lobes with greatest depth contained less than twice in the greatest length of same. Tegmina distinctly laterad, separated by more than their own width, in form semi-ovate, not reaching to caudal margin of the metanotum, humeral trunk indicated. Disto-dorsal abdominal segment subtruncate; supra-anal plate slightly broader than long, rounded subtrigonal. Ovipositor elongate, more than twice the length of the pronotal disk, moderately robust, dorsal margin moderately arcuate, slightly flattened mesad, ventral margin straight except for a short and decided arcuation distad, dorsal margin armed on distal fifth with six spines, ventral margin armed on same section with six to eight spines, the extreme ones of latter series slightly recurved; subgenital plate with chitinous portion divided in two, these present as lateral subpyriform lobes with very acute apices. Cephalic femora slightly and median femora decidedly exceeding the combined length of head, pronotum, and tegmina. Caudal femora slightly less than twice the length of median femora.

Measurements (in millimeters).

	$\sigma^7 \sigma^7$ Dallas, Texas.			Average of three specimens.
	(Described spec.; U. S. N. M.)	(Scudder Coll.)	(U. S. N. M.)	
Length of body.....	15.3	.....²⁷	13.2	14.2
Length of pronotum.....	4.2	3.6	4.	3.9
Greatest caudal width of disk of pronotum.....	3.	2.5	2.7	2.7
Length of tegmen.....	3.7	3.5	3.4	3.5
Greatest width of discoidal and anal fields of tegmina.....	3.2	2.5	3.1	2.9
Length of cephalic femur.....	8.9	.....	.....	.....
Length of median femur.....	9.9	.....	9.4	9.6
Length of caudal femur.....	20.	15.	19.7	18.2

²⁷ This specimen is so badly shrunken that we have not considered the body length.

	Texas. (TYPE meas., ex Brunner)	Gregory, Tex.	Beeville, Tex.	Uvalde, Tex.
Length of body	14.	17.6	15.7	16.7
Length of pronotum	4.5	4.1	4.	3.9
Greatest caudal width of disk of pronotum		2.7	2.3	2.7
Length of tegmen		4.	3.6	3.6
Greatest width of discoidal and anal fields of tegmen		3.2	3.	3.
Length of cephalic femur	9.5	10.	9.4	10.
Length of median femur		11.2	10.	10.7
Length of caudal femur	20.	23.	21.8	22.5

♀ ♀
Dallas, Texas.

	(Described spec., U. S. N. M.)	(Seudder Coll.)	(Seudder Coll.)
Length of body	18.6	13.	16.
Length of pronotum	6.	5.	6.
Greatest caudal width of disk of pro- notum	3.2	3.	3.4
Apparent length of tegmen	1.4	.7	1.
Width of entire tegmen	2.	2.1	1.6
Length of cephalic femur	9.3		
Length of median femur	10.2		
Length of caudal femur		20.8	23.8
Length of ovipositor	10.3	11.1	12.7

♀ ♀
Dallas, Texas.

	(U. S. N. M.)	Average of four specimens.	Texas. (TYPE meas., ex Brunner.)
Length of body	17.2	16.1	15.
Length of pronotum	5.5	5.6	5.
Greatest caudal width of disk of prono- tum	3.	3.1	
Apparent length of tegmen	1.2	1.	
Width of entire tegmen	2.	1.9	
Length of cephalic femur	8.4	8.8	9.
Length of median femur	9.	9.6	
Length of caudal femur	21.	21.8	22.
Length of ovipositor	11.3	11.3	13.

The Dallas male from the Seudder Collection is the smallest of seven of that sex from the same locality, while the two females from the same series represent the extremes of six females contained

therein. It is quite evident that considerable individual variation is present in the species, this being pronounced in the Dallas representation, which is the only series of any size. Too little material is available to consider possible geographic variation in size.

Color Notes.—But two of the specimens before us have been stuffed, these (both males) forming the basis of most of the following notes. As usual there is a dorsal color, a lateral color, and paired pale lateral lines in the male, while in the female the dorsal and lateral colors are nearly or quite uniform and the pale lines hardly or but weakly indicated.

Lateral and ventral color of male ranging from lumiere green to apple green, in unstuffed specimens ranging to old gold. Dorsal color consisting of an overlying tint running from chestnut through burnt sienna to orange rufous (in unstuffed specimens), covering the lateral portions of occiput, all or nearly all of disk of pronotum and lateral portions of dorsum of abdomen. Pale paired lines in male extending from eye to base of cercus, ranging from pale viridine yellow to creamy white. Head with fastigium and occiput bearing a narrow medio-longitudinal line of the color of the pale lines, finely bordered with lines of the dorsal color; eyes ochraceous tawny to liver brown, crossed obliquely by an irregular slightly darker line. Pronotum in some specimens with the color dilute caudo-laterad, in tone approaching the lateral color, the pure dorsal color being restricted to a median band; lateral lobes more or less suffused dorso-caudad with the dorsal color; ventral margins edged with the color of the pale lateral lines. Tegmina with the marginal field of the color of the pale lateral lines, humeral trunk chestnut, discoidal field and large part of the anal field blackish brown, the venation varying from buff yellow to neva green, the latter tone only present on the discoidal field, the venation of the proximal half of anal field in all specimens approaching buff yellow. Dorsum of abdomen with the median section very close to the lateral color, the margins of all the segments finely and closely beaded with the dorsal color on an edging of the tone of the pale lateral bars. Limbs with the femora of the lateral color, distad becoming infusate with ochraceous-orange, the tibiae entirely of the latter color; cephalic tibiae with the vicinity of the foramina narrowly lined with blackish, a disto-genicular area on the median tibiae more or less marked with the same, tarsi of the same limbs more or less clouded with bone brown. Caudal femora with distal eighth more or less solidly blackish brown, pattern on external face more or less distinct in all, medio-longitudinal in

position; caudal tibiæ more or less completely infusate with bone brown.

General color of female (unstuffed specimens) olive ochre to honey yellow, finely punctulate with maroon, these punctulations thickest on the dorsum of the abdomen and practically absent from the face, genæ, and lateral lobes of the pronotum. Limbs varying from uniform apple green to the general color, more or less suffused with vandyke brown. Pale lateral bars hardly indicated or weak in the female, tegmina almost wholly of the same tone. Ovipositor of the general color, suffused distad with sepia to brownish black.

Distribution.—The range of this species covers a considerable area of Texas south and east of the Edwards Plateau and plateau plains, being known from four localities, viz., Dallas, Gregory, Beeville, and Uvalde. Dallas constitutes the northern and eastern limit of its known range, Gregory the southern, and Uvalde the western. The vertical range of the species is from practically sea-level at Gregory to eleven hundred feet elevation at Uvalde.

Biological Notes.—All we know regarding the habits, etc., can be taken from our own notes, based on the capture of three specimens. At Gregory we obtained the species from a green tangle about a mesquite clump, where *D. brevihastata* was also secured; at Beeville it occurred in weeds near a tangle of low vine-covered bushes, while at Uvalde it occurred with *D. castanea* on *Acacia berlandieri* growing on the low hill slopes.

Morphological Notes.—The male cerci seem to be very constant in form, but the distal margin of the male subgenital plate shows considerable variation, in some specimens (Dallas) considerably approximating *D. gladiator* in this respect, from which species, however, cercal and other characters readily separate them. This variation is due to a certain amount of plasticity in the shape of this margin, which ranges from distinctly rectangulate emarginate (as it is in the majority of specimens) to a type which has the angulation obtuse with the lateral angles much more rounded than in the typical form.

In the female the ovipositor shows some variation in the straightness of the ventral margin, this being slightly arcuate in three Dallas individuals, but this arcuation is not as decided as in *gladiator*, the general form and robustness of the ovipositor being different from that found in the latter. In two Dallas females the tegmina are hardly visible beyond the pronotum, but the specimens are unquestionably adult. The tegmina project slightly caudad of the adjacent

(lateral) margins, but not (or hardly) caudad of the dorsal margin of the pronotum (caudal margin of disk).

Remarks.—There can be little doubt of the correctness of associating Brunner's name with this species, as apparent discrepancies between the description and present material seem to be entirely color differences or else due to a different conception of terms and the relativity of such. The evidence we have of the probable source of the original material and locality of the same assists one considerably in locating the species, as but one form of the genus is, so far as known, found in the Dallas region.

Specimens Examined.—21; 12 males, 9 females.

Dallas, Texas, (Boll), 7 ♂, 6 ♀, [Scudder Collection]; 1 ♂, [U. S. N. M.].

Dallas, Texas, 1 ♂, 2 ♀, [U. S. N. M.].

Texas, (Belfrage), 1 ♀, [Scudder Collection].

Gregory, San Patricio Co., Texas, July 30, 1912, (H.), 1 ♂.

Beeville, Bee Co., Texas, July 28, 1912, (H.), 1 ♂.

Uvalde, Uvalde Co., Texas, elev. 1,000–1,100 feet, August 21–22, 1912, (R. and H.), 1 ♂.

*Dichopetala oreæca*²⁸ n. sp.

Closely related to but a single species—*D. catinata* (*vide infra*)—from which it can immediately be separated by the lobe of the male cercus having the margins converging distad, by the ventral margin of the same with a distinctly indicated longitudinal cingulum, the narrower subgenital plate of the male, which has the lateral margins subparallel distad, and by the more ample tegmina in the same sex, while in the female sex the ventral margin of the lateral lobes are straighter in the present species, the ovipositor is more elongate, with the dorsal margin more regularly arcuate and the distal teeth of same more numerous, and the apices of the subgenital plate spiniform, while in both sexes the eyes are less prominent in *oreæca*.

TYPE: ♂; Canyon behind Pulliam Bluff, Chisos Mountains, Brewster Co., Texas. Elev. 4,600–5,000 feet. September 7, 1912. (Rehn and Hebard.) [Hebard Collection.]

Description of Type.—Size medium; form moderately elongate. Head with the occiput full, but little declivent to the fastigium and antennal scrobes; fastigium compressed, lamellate, in contact with the fastigium of the face; eyes prominent, ovate in outline, infra-ocular portion of the genæ but little longer than the eye; antennæ

²⁸ Ὀρέτωκος, mountain-dwelling.

about four and a half times as long as the body, proximal joints cylindrical. Pronotum very faintly sellate, dorsal line weakly ascending caudad when seen from the side; form of disk as usual in the genus, the median width hardly more than half that of the caudal margin of the same, regularly diverging cephalad and caudad, more sharply so cephalad; lateral margins of disk indicated on metazona by rounded angles, by color alone on prozona; cephalic margin of disk subtruncate, caudal margin of disk almost imperceptibly

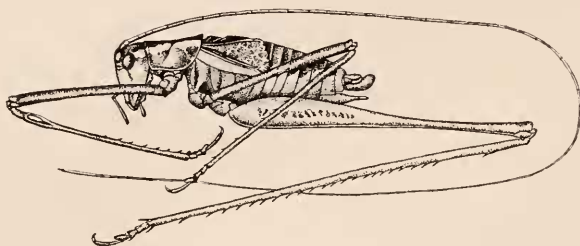


Fig. 33.—*Dichopetala oreæca* n. sp. Lateral view of type. ($\times 2$.)

arcuate; transverse sulcus broadly V-shaped mesad on disk, severing the lateral margins of the disk mesad; lateral lobes of the pronotum with the greatest depth contained one and one-half times in the dorsal length of the same, cephalic margin sinuato-truncate, ventrocephalic angle blunt, nearly rectangulate, ventral margin arcuato-truncate, gently rounding into the oblique arcuato-truncate caudal margin. Tegmina in length nearly equal to that of the combined



Figs. 34 and 35.—Outline of cercus of males (types) of *Dichopetala oreæca* (34) and *D. catilana* (35). ($\times 10$.)

head and pronotum; costal margin gently arcuate, disto-caudal angle quadrantiform, distal margin obliquely passing into the distal portion of the sutural margin, the latter roundly obtuse-angulate at the extremity of the stridulating vein, obliquely arcuato-sinuate distad of the same; marginal field moderately wide, discoidal field regularly widening in the distal two-thirds, anal field with the greatest length little more than the greatest width, stridulating vein gently

arcuate, tympanum unequally trigonal, anal vein moderately arcuate. Abdomen with the disto-dorsal segment having the distal margin proper sinuato-truncate; supra-anal plate broad, rotundato-trigonal, with folded rounded lateral flaps; cerci with proximal portion moderately robust, cylindrical, lobe diverging proximad of the middle of the shaft, expanding into a broad convex structure like an inverted spoon, the dorsal margin arcuato-truncate, ventral margin considerably arcuate and with a distinct marginal longitudinal cingulum, apex rather narrowly rounded, whole lobe directed dorso-mesad, remainder of shaft acute, tapering, aciculate, triquetrous in section, arcuate, lying under the lobe and following the same

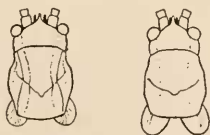


Figs. 36 and 37.—Ventral outline of subgenital plate of males (types) of *Dichopetala catinata* (36) and *D. oreæca* (37). ($\times 4$.)

general curve; subgenital plate rather ample, distal half with lateral margins moderately converging, thence straight and subparallel to the tips, distal margin nearly rectangulate emarginate, the lateral angles moderately acute, the ventral surface with a distal medio-longitudinal carina. Cephalic femora about one and two-thirds times as long as the length of the head and pronotum together; cephalic tibiae with the foramina elongate elliptical. Median femora subequal to the median pair in length. Caudal femora slightly more than twice the length of the cephalic femora, moderately inflated proximad.

Allotype: ♀; Moss Well, Chisos Mountains, Brewster Co., Texas. Elev. 4,700 feet. September 5-8, 1912. (Rehn and Hebard.) [Hebard Collection.]

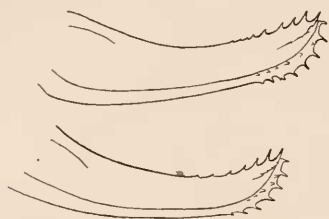
Description of Allotype.—The following characters are those of difference from the male sex. Form rather robust. Antennæ about twice the length of the body. Pronotum not at all sellate, the dorsal line nearly straight when seen from the side; median width of the disk proportionately greater than in the male; lateral margins of the disk indicated almost wholly by color; cephalic and caudal



Figs. 38 and 39.—Dorsal outline of head, pronotum, and tegmina of females (allotypes) of *Dichopetala oreæca* (38) and *D. catinata* (39). ($\times 2$.)

margins of the disk as in the male; lateral lobes as in the male except that the ventral margin is subsinuate. Tegmina lateral, very small, rotundate, distal margin slightly flattened, interspace between the tegmina subequal to width of a single tegmen. Disto-dorsal abdominal segment with the distal margin subarcuate, arcuato-emarginate

laterad; supra-anal plate broadly tongue-shaped; ovipositor about twice the length of the disk of the pronotum, moderately robust and arcuate, tapering in proximal two-thirds, dorsal margin very considerably and regularly arcuate to the very apex, ventral margin very faintly arcuate except for the distal fourth which forms a quadrant, dorsal margin with seven to eight distal teeth, increasing in length distad, ventral margin with nine to ten distal teeth increasing in length distad and with the apical ones



Figs. 40 and 41.—Outline of ovipositor of allotypes of *Dichopetala oreæca* (40) and *D. catinata* (41). ($\times 4$)

somewhat recurved; subgenital plate almost divided in two (chitinous portion completely divided), lateral sections elongate acute, the tips aciculate, slightly curved toward the median line of the body. Cephalic femora about one and two-thirds times the length of the head and pronotum together.

Median femora slightly longer than the cephalic femora. Caudal femora about two and one-half times the length of the cephalic femora.

Paratypic Series.—We have selected as paratypic eight males: two from canyon behind Pulliam Bluff (locality of Type) and the remainder from Moss Well (locality of Allotype).

Measurements (in millimeters).

	σ^7		
	Canyon behind Pulliam Bluff, Chisos Mts., Tex. (TYPE)	Average of six specimens from Chisos Mts., Tex. (TYPE and Paratypes)	Average of four specimens from Davis Mts., Tex. (Paratypes)
Length of body	15.8	15.8 (14. -16.9)	15.1 (14.3-16.)
Length of pronotum	3.9	3.7 (3.5- 3.9)	3.9 (3.8- 4.)
Greatest caudal width of disk of pronotum	2.5	2.6 (2.5- 2.9)	2.8 (2.6- 3.)
Length of tegmen	5.3	4.8 (4.3- 5.3)	4.7 (4.6- 5.)
Greatest width of discoi- dal and anal fields of tegmen	3.2	3.3 (3.2- 3.8)	3.4 (3.3- 3.5)
Length of cephalic femur	10.2	9.7 (8.9-10.3)	8.8 (8.4- 9.5)
Length of median femur	10.1	10.1 (9.2-11.)	9.5 (9.2-10.1)
Length of caudal femur	21.5	21.1 (19.6-22.5)	20.3 (19.5-21.8)

	♀ ♀			
	Moss Well, Chisos Mts., Tex. (Allotype)	Marathon, Tex. (Paratype)	Average of four specimens from Davis Mts., Tex. (Paratypes)	Monte- lovez, Coahuila. [Seudder Coll.]
Length of body (exclusive of ovipositor).....	16.3	21.5	19.9 (19. -21.3)	15.5
Length of pronotum.....	5.	5.	5.1 (5. - 5.3)	4.4
Greatest caudal width of disk of pronotum.	3.1	3.9	3.2 (3.1- 3.5)	3.
Apparent length of tegmen.....	1.1	1.	1. (.9- 1.5)	.7
Greatest width of tegmen.....	2.	2.2	1.9 (1.9- 2.)	1.2
Length of cephalic femur.....	9.7	10.2	9.3 (9. - 9.5)	..
Length of median femur.....	10.4	11.3	10.2 (10. -10.5)	8.2
Length of caudal femur.....	24.	24.6	23.5 (23.2-24.)	20.
Length of ovipositor.....	10.4	10.9	10.8 (10.5-11.6)	9.

From the very small size of the Montelovez female it would seem that at the southern end of its known range the species is quite under the proportions of Texan specimens, although it is best to make such a statement guardedly, as it would appear from the evidence of the Texan material that size variation is, in large part at least, individual. In the Texan series our individual lots are not of sufficient size to be really comparable, although the Marathon female appreciably exceeds individuals of the same sex taken at higher elevations, while in the male sex the measurements so overlap in the Chisos and Davis series that the differences appear to be purely individual. Probably a series from Marathon would show as much size variation as similar representations from other localities.

Color Notes.—The intensive and recessive extremes of this species are considerably different, the latter being more decided in the female than in the male. The components of the pattern are the usual dorsal latero-ventral, and pale pattern colors, the first two being wholly or in large part indistinguishable in the recessive females, the pale pattern almost completely lacking in the same and weaker than usual in recessive males. In the more or less intensive males and females the pale pattern is very broad, in fact broader than in any of the other forms of the genus.

Dorsal color in recessive males limited to the sides of the dorsum of the head, cephalic two-thirds of the disk of the pronotum, humeral

trunk, vicinity of the anal vein and part of the anal field of the tegmina, indicated on the abdomen only by a lineation margining the pale lines dorsad; in the intensive males coloring the occiput, the dorsum of the pronotum, greater portion of the tegmina and generally the dorsum of the abdomen except mesad. The tone of the dorsal color varies from claret brown to maroon, in the intensive extreme blackish laterad on the abdomen. Lateral color in the male varying from lettuce green to oil green, in the recessive extreme coloring the middle of the occiput and the greater portion of the dorsum of the abdomen with oil green, in the intensive extreme the latter is represented by a median section of oil yellow, occasional individuals having this mars yellow and antique brown. The pale pattern varies in tone from flat white to pale orange-yellow (on the abdomen only), occasionally tinged with greenish, the pattern coloring the usual areas and in the intensive individuals almost as wide on the pronotum as on the tegmina, the ventral margin of the lateral lobes edged with the same in intensive specimens. Head with a medio-longitudinal occipito-fastigial thread of the pale color, faintly tinged with the encompassing color; broad vertical infra-ocular and infra-antennal bars of the pale pattern rather strongly (intensive) or weakly (recessive) contrasted; antennæ of the dorsal color (intensive) or orange (recessive); eyes varying from auburn to bay. Tegmina with the ground color of the discoidal field and much of the anal field blackish brown, the overlying venation and solid paler section of the anal field of the lateral color (recessive) or mars yellow (intensive). Abdomen with the dorsal section of the segments more or less decidedly edged distad with the pale pattern; disto-dorsal abdominal segment largely of the dorsal color; cerci varying from greenish proximad and weak mahogany red distad to entirely orange rufous. Limbs of the lateral color, not at all (recessive) or more or less (intensive) washed with burnt sienna on the tibiæ and the distal extremities of the femora; genicular region of the caudal femora blackish in intensive individuals; pattern of the pagina of the caudal femora restricted, decided in intensive and weak in recessive individuals, ventro-lateral face of caudal femora flat white in intensive specimens; foramina of cephalic tibiæ whitish with a seal brown figure.

The recessive females are nearly uniform old gold to biscay green, passing into civette green on the limbs, the head pale green yellow with no markings except a faint postocular pale bar and an edging of claret brown dorsad to the same; pronotum more or less parrot

green caudad, the pale lines weak; tegmina claret brown mesad, marginal field of the pale pattern; abdomen with weak narrow paired pale lines, more or less distinctly edged dorsad by a line of claret brown; ovipositor touched with pinkish proximad, the teeth black tipped. Intensive females with the dorsal color covering most of the occiput (not mesad), the cephalic and at least part of the caudal section of the disk of the pronotum, in tone varying from claret brown to mahogany red. The lateral color varies, in intensive individuals (stuffed specimens) from olive green to ochraceous-tawny, passing into variscite green on the pleura and coxæ of ochraceous-tawny specimens, the lateral color covering the dorsum of the abdomen and limbs as well as the lateral and ventral aspects. Pale pattern in intensive specimens broad, very broad on abdomen. Head in intensive specimens with the vertical bars described in the male rather weakly indicated, otherwise as in that sex. Pronotum with the color of the caudal portion of the disk passing from the dorsal color into that of the lateral regions, the pale bars outlined dorsad more or less distinctly with blackish; lateral lobes occasionally washed with hoary white. Tegmina of intensive females with the base color of the discoidal field blackish. Abdomen with the lateral coloration more or less sprinkled with claret brown stipplings; lateral pale bars more or less washed with flesh pink to rose pink, sharply outlined dorsad on each segment by semi-lunate edgings of black, which form continuous series conforming in arcuation to the form of the abdomen; ovipositor in intensive specimens strongly garnet brown to victoria lake on proximal two-thirds of dorsal margin. All limbs with the genicular region more or less strongly and sharply suffused with claret brown; all tarsi blackish. Caudal limbs with the pattern as in intensive males, in one individual the dorsal section of the proximal half of the femora is largely whitish.

Both the type and allotype are intensive individuals. With a single exception, all of the nymphs seen are in or approaching the intensive condition, the exception being about midway between the two extremes.

Distribution.—The present species has a very limited range, being found so far as known only at certain elevations in western Texas and at an unlocated point in Coahuila, Mexico. Aside from Marathon, Texas, the species is known only in that State from the Davis and Chisos Mountains, the former range beginning about forty miles northwest of Marathon, the latter lying seventy-five miles due south from the same point. At Marathon (where it was very infrequent

and occurred with *D. brevihastata*) it was taken between 3,900 and 4,160 feet, while in the Davis Mountains it occurred in Lower Limpia Canyon at 4,900 feet, at Maguires Ranch in Upper Limpia Canyon at 5,600 feet and on the slopes of Pine Mountain at 6,500 feet. In the Chisos Mountains it was secured at Moss Well at 4,500–5,300 feet, in the canyon behind Pulliam Bluff at 4,600–5,000 feet and on the slopes of Lost Mine Peak at 6,000 feet. The vertical range of the species is thus seen, at least in Texas, to extend from about 3,900 to 6,500 feet.

Biological Notes.—This peculiar species has been found in a number of situations, on bare rock, in grasses and weeds, in a number of species of shrubby plants and in low trees, once in a nogal or walnut tree (*Juglans rupestris*). In such places they climb gingerly about, at night giving occasionally a very faint hisping stridulation, of a tinkling, sibilant character, which can be represented by *zip-a zip-a zip-a zip-ip-ip-ip*, the last portion being given infrequently and then very rapidly. This note can scarcely be heard at a distance greater than six feet.

Morphological Notes.—In the male the greatest morphological variation appears to be that in the angulation of the distal margin of the subgenital plate, this being more broadly obtuse-angulate in many specimens than in the type, while the bottom of the emargination is nearly rounded in one individual. The male tegmina vary somewhat in bulk, this causing the disto-sutural margin to appear nearly straight in those having the longest tegmina and more or less arcuate (or subangulate) at the apex of the anal vein in those with shorter tegmina. The caudal margin of the disk of the pronotum is truncate in some and feebly emarginate in other specimens, but weakly arcuate (as in the type) in the majority. The female tegmina vary considerably in proportionate size, and the interspace between the same consequently shows an equal amount of variation, ranging from but little over half to that of a whole tegmen width. The ovipositor exhibits similar variation in depth to that seen in certain other species of the genus, in the majority of specimens the distal half being subequal in depth and tapering only in the proximal half, although the form of the margins remains practically the same. The spines at the distal extremity of the ovipositor vary in number from seven to nine dorsad and seven to ten ventrad.

Remarks.—The peculiar characters of the male of this form immediately separate it from all of its congeners except *catinata*, from which it can readily be distinguished by the lobe of the cercus not being

subtruncate at the apex and having the margins of the same converging distad. The female is not so readily separated, but it is hardly likely to be confused with anything but *catinata*, the characters of difference from which are given in the diagnosis. This is peculiarly a mountain form, the Marathon locality being very close to the foot of mountains in conditions not at all desert-like. The last-mentioned locality was the only place in Texas where it was found associated with another species of the genus (*D. brevihastata*), which there far outnumbered the present form. The large tegmina of the male are quite characteristic of *oreæca*, which in the male sex and in the intensively colored female is remarkably pretty.

Specimens Examined.—30; 13 males, 7 females, 1 male nymph, 9 female nymphs.

Pine Mountain (slopes), Davis Mountains, Jeff Davis Co., Texas, elev. 6,500 feet, August 29, 1912, (R. and H.), 1 ♂.

Maguires Ranch, Upper Limpia Canyon, Davis Mountains, Jeff Davis Co., Texas, elev. 5,600 feet, August 29, 30, 1912, (R. and H.), 3 ♂, 3 ♀.

Lower Limpia Canyon, Davis Mountains, Jeff Davis Co., Texas, elev. 4,900 feet, August 31, 1912, (R. and H.), 1 ♀.

Marathon, Brewster Co., Texas, elev. 3,900–4,160 feet, September 12, 13, 1912, (R. and H.), 1 ♀.

Moss Well, Chisos Mountains, Brewster Co., Texas, elev. 4,500–5,300 feet, September 5–8, 1912, (R. and H.), 6 ♂, 1 ♀ (paratypes and allotype), 5 ♀ nymphs.

Canyon behind Pulliam Bluff, Chisos Mountains, Brewster Co., Texas, elev. 4,600–5,000 feet, September 7, 1912, (R. and H.), 3 ♂ (TYPE and paratypes), 4 ♀ nymphs.

Lost Mine Peak, Chisos Mountains, Brewster Co., Texas, elev. 6,000 feet, September 6, 1912, (R. and H.), 1 ♂ nymph.

Montelovez, Coahuila, Mexico, September 20, 1 ♀, [Scudder Coll.].

Dichopetala catinata n. sp.

Closely related to only *D. oreæca* (*vide supra*), under which the differential diagnostic characters are set forth.

TYPE: ♂; Brownsville, Cameron Co., Texas. July 31, 1912. (Hebard.) [Hebard Collection.]

Description of Type.—It seems necessary only to state characters not fully in accord with those of *oreæca*. Size moderate. Eyes very prominent, ovate, their depth contained one and one-third times in that of the infra-ocular portion of the genæ. Pronotum hardly sellate; disk of pronotum with median width very slightly more than

half that of the caudal margin of the same; lateral margins of the disk regularly diverging cephalad and caudad; transverse sulcus with an impressed subobomegoid figure; lateral margins of the disk with a more or less distinct angle everywhere except mesad; cephalic and caudal margins of the disk arcuato-truncate; lateral lobes of the pronotum with the ventral margin distinctly sinuate and the caudal margin less oblique. Tegmina not longer than the pronotal disk, general form as in *oreæca*, but with the sutural margin rotundato-rectangulate at the apex of the stridulating vein; marginal field narrow, discoidal field regularly expanding for nearly its whole length, anal field with its greatest width about two-thirds of its length, stridulating vein arcuate, slightly bent near the proximal third, tympanum poorly defined, but with the general form much as

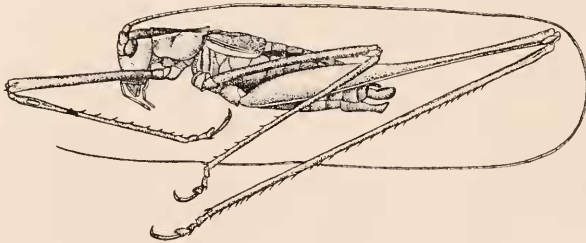


Fig. 42.—*Dichopctala catinata* n. sp. Lateral view of type. ($\times 2$)

in *oreæca*. Disto-dorsal abdominal segment with the distal margin slightly emarginato-truncate, subrectangulate laterad of the same and deeply and sharply arcuato-emarginate at the bases of the cerci; supra-anal plate quadrate with rectangulate angles; cerci in general much as in *oreæca*, but the lobe is larger, the margins subparallel, and the apex arcuato-truncate, while but a trace of the ventral cingulum is present; subgenital plate ample, produced, arcuate in transverse section, lateral margins concavely emarginate, distal margin arcuate V-emarginate, lateral angles moderately acute, diverging, ventral surface with a low median carina distad. Cephalic femora about one and two-thirds times as long as the head and pronotum together. Median femora slightly longer than the cephalic femora. Caudal femora about twice the length of the median femora.

Allotype: ♀; Brownsville, Cameron Co., Texas. August 1, 1912. (Rehn and Hebard.) [Hebard Collection.]

Description of Allotype.—The following characters are those of difference from the female of *oreæca*. Pronotum with the disk broad mesad, at least three-fourths the caudal width of the same; cephalic

and caudal margins of disk subtruncate; lateral lobes of the pronotum with the ventral margin sinuato-emarginate dorsad of the coxæ. Tegmina more dorsal than in *oreæca*, semi-ovate, separated by an interval less than half the width of a single tegmen. Disto-dorsal abdominal segment with the distal margin subtruncate; supra-anal plate transverse, rounded; ovipositor slightly less than twice the length of the pronotal disk, moderately robust, margins as in *oreæca*, the extremity of the dorsal margin with six, that of the ventral margin with seven spines; subgenital plate with the chitin divided in two, the lateral sections elongate, sublanceolate, the immediate apex blunted. Cephalic femora about twice the length of the disk of the pronotum. Median femora slightly longer than the cephalic femora.

Paratyptic Series.—We have before us two paratypes, one an imperfect adult male, the other an immature male, both taken at Brownsville, July 31–August 5.

Measurements (in millimeters).

	Brownsville, Texas.		
	♂ (TYPE)	♂ (Paratype)	♀ (Allo- type)
Length of body	17.6	15.4	16.2
Length of pronotum	4.	4.	4.5
Greatest caudal width of disk of pronotum	2.7	2.7	3.
Length of tegmen	4.	3.7	1.5
Greatest width of discoidal and anal fields of tegmen (♂) or of entire tegmen (♀)	2.8	2.7	2.1
Length of cephalic femur	9.8	10.5	8.8
Length of median femur	10.8	11.	9.5
Length of caudal femur	22.		22.
Length of ovipositor			8.9

Color Notes.—As but the type and allotype of *catinata* have fully retained their original coloration, the following notes are based entirely on them.

Male (TYPE). General pattern consisting of a dorsal color, a latero-ventral color and a pale pattern, the first covering the occiput, the dorsum of the pronotum, humeral trunk, discoidal and greater portion of anal fields of the tegmina and greater portion of the dorsum of the abdomen. The tone of this color is between burnt sienna and chestnut, that of the latero-ventral color cosse green, while the pale pattern runs from creamy on the head to white on the tegmina and

pinard yellow on the abdomen, the latter pattern limited to a medio-longitudinal occipital and fastigial thread, and paired bars extending caudad from the eyes along the lateral margins of the disk and margining laterad the dorsal color of the abdomen. Head with the face, mouth-parts, genæ, and much of the postocular region maize yellow; eyes bay; antennæ of the dorsal color proximad, passing into antique brown with a few well-spaced moderately broad annuli of seal brown. Pronotum with the pale bars slightly tinged with greenish, in the vicinity of the angle the caudal margin of the disk and of the lobes is blackish. Tegmina with the marginal field wholly* of the pale color, the distal portion of the discoidal field with the base color blackish brown and the vein pattern of the general dorsal color, anal field with the vicinity of the proximal two-thirds of the anal vein broadly blackish brown, the proximal portion of the sutural margin edged with same, median section of the anal field washed with barita yellow. Dorsum of the abdomen with the median portion of the segments having the base color weak and each segment with a proximal area of pinard yellow (most decided proximad), laterad the dorsal color is outlined with blackish, this latter oblique and independent on each segment, the contiguous yellowish portion of the pale pattern broken up in consequence. Disto-dorsal abdominal segment of the dorsal color, cerci mars yellow. Cephalic limbs mars yellow, passing into the latero-ventral color proximad, the tarsi clove brown. Median femora largely of the lateral color passing into mars yellow, tarsi clove brown. Caudal femora of the lateral color, passing distad into mars yellow with a decided genicular area of blackish, pattern of pagina pronounced, but not extensive; caudal tibiæ seal brown dorsad, honey yellow ventrad, caudal tarsi seal brown.

Female (Allotype). Nearly uniform light yellowish olive (probably more vivid in life), passing into light bice green on the limbs, approaching forest green on the medio-longitudinal portion of the caudal femora, the ventral carina of the same whitish. Pale lines feebly indicated on the head and the cephalic portion of the pronotum; caudal margin of the pronotum with blackish as in the male; disk of the pronotum with a faint medio-longitudinal thread of auburn, which is intersected by a black spot at the crossing of the transverse sulcus; eyes auburn; antennæ aniline yellow passing into pyrite yellow distad with a few scattered weak annulations. Tegmina weakly suffused with antique brown mesad. Abdomen with the tegmina covering a blackish blotch.

Distribution.—The present species is only known from the vicinity of Brownsville in the arid tropical Tamaulipan section of the lower Rio Grande Valley, Texas. The range of the species unquestionably extends south into Mexico.

Biological Notes.—This form was numerous in vine-covered hedges and tangles near old Fort Brown, Brownsville, where they were heard stridulating at numerous points about dusk, but they were extremely difficult to secure, owing to their surroundings, as they always sought refuge within the tangled hedges when approached. The stridulation is a faint *tsikh*, repeated at intervals of about twice the length of the note.

Morphological Notes.—From the evidence of the two males, the median width of the disk of the pronotum is seen to vary somewhat, in the paratype this being as much as two-thirds the caudal width of the disk.

Specimens Examined.—4; 2 ♂, 1 ♀, 1 ♂ nymph.

Brownsville, Cameron Co., Texas, July 31–August 3, 1912, (R. and H.), 2 ♂, 1 ♀, 1 ♂ nymph. TYPE, allotype and paratypes.

Dichopetala tauriformis n. sp. *

This is a very peculiar and distinct species having no close relationship to any other form in the genus, in the female sex showing some affinity to *falcata* and in the male sex approximating *pollicifera* more nearly than anything else. The peculiar appendage of the supra-anal plate of the male, the anomalous cerci, the strongly depressed median section of which, together with the elongate aciculate tooth which is peculiarly curved, and the unusual structure of the distal section of the shaft, as well as the very decided peculiarities of the subgenital plate at once distinguish the male sex, while in the female the ovipositor is proportionately the longest and heaviest in the genus, the subgenital plate with its lateral trigonal lobes also being quite different from that found in *falcata*.

TYPE: ♂; Mountains twelve leagues east of San Luis Potosi, Mexico. (Palmer.) [Scudder Collection.]

Description of Type.—Size above the average for the genus; form moderately slender. Head with the occiput rather strongly declivent to the fastigium and antennal scrobes; fastigium low, slightly compressed, weakly sulcate dorsad, not touching the frontal fastigium; eyes prominent, elongate ovoid, their length two-thirds that of the infra-ocular portion of the genæ. Pronotum weakly sellate, the

dorsum moderately deplanate in transverse section; disk with the lateral margins indicated by a weak angle as well as by color, angle weakest mesad, arcuate inbowed, most approximate at the transverse sulcus which is slightly cephalad of the middle; greatest caudal width of dorsum about two-thirds the greatest length of same; cephalic margin subtruncate, very weakly emarginate mesad, caudal margin very gently arcuato-emarginate; transverse sulcus impressed in an obomegoid figure mesad, faint cephalic and caudal traces of a

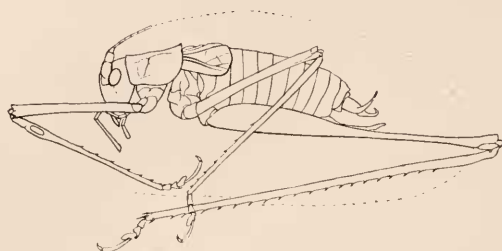
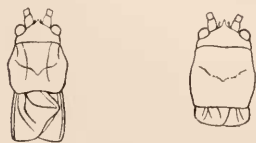


Fig. 43.—*Dichopetala tauriformis* n. sp. Lateral outline of type. ($\times 2$.)

longitudinal sulcus; lateral lobes of the pronotum with greatest depth contained one and two-thirds times in the greatest dorsal length of same, cephalic margin straight, ventro-cephalic angle narrowly rounded rectangulate, ventral margin gently arcuato-emarginate, the greatest depth of the lobes caudal, ventro-caudal angle and caudal margin moderately arcuate except the dorsal portion of the latter which is truncate. Tegmina somewhat inferior to pronotum in length; costal margin straight, disto-costal angle well

rounded, distal margin slightly oblique, truncate-arcuate, sutural margin rectangularly produced at the extremity of the stridulating vein, distal portion of the same margin obliquely sinuato-truncate; marginal field rather narrow, discoidal field regularly expanding from the proximal third, anal vein straight and not arcuate, anal field with the greatest length but little more



Figs. 44 and 45.—*Dichopetala tauriformis* n. sp. Dorsal outline of head, pronotum and tegmina of male (type: 44) and female (allotype: 45). ($\times 2$.)

than greatest width, stridulating vein slightly arcuate, tympanum proper poorly defined. Abdomen with lateral margins subparallel, disto-dorsal abdominal segment strongly transverse, the greatest length of the same not more than one-fifth its greatest width,

caudal margin of the segment arcuato-sinuate, slightly produced mesad into a low truncate lobe, which is the hinge of the supra-anal plate, the latter with the length subequal to the greatest proximal width, lateral margins approximating distad, distal margin broadly V-emarginate, lateral angles slightly acute, from the dorsal surface of the supra-anal plate immediately proximad of the apex is erected a structure like the Greek letter Υ , but with the cross bar slightly straighter; cerci



Fig. 46.—*Dichopetala tauriformis* n. sp. Dorsal outline of apex of abdomen of male (type). (× 4.)

very complex, having first a semicircular transverse lamellate ridge proximad, distad of which the whole cercus is depressed, obliquely and strongly so toward the internal margin, that which we consider the shaft proper directed meso-caudad, narrowing, strongly depressed, the distal extremity bent inward at a right angle, apex acute, tooth developed from the external margin but little distad of the base, depressed proximad, there lamellate, becoming aciculate distad,



Fig. 47.—*Dichopetala tauriformis* n. sp. Ventral outline of subgenital plate of male (type). (× 4.)

curving dorsad and mesad, as long as the shaft; subgenital plate greatly produced, reaching nearly to the tips of the cerci, lateral margins regularly arcuato-concave, the distal extremity distinctly broader than the median width, distal margin with a decided median quadrate emargination, laterad of which the margin is obliquely truncate, angles acute with the immediate angle blunted. Cephalic femora subequal to the length of the head, pronotum, and tegmina; cephalic tibiae with elliptical foramina. Median femora half the length of the caudal femora. Caudal femora longer than the body, moderately inflated, very gradually tapering distad.

Allotype: ♀; same data as the type.

Description of Allotype.—The following points are those of difference from the type. Head with the occiput more roundly declivent. Pronotum with the dorsum broader, the lateral margins of the disk (which are indicated almost wholly by color) nearly parallel to the transverse sulcus, thence moderately diverging; cephalic margin with the emargination more decided, that of caudal margin less decided; disk with almost no traces of



Fig. 48.—*Dichopetala tauriformis* n. sp. Outline of ovipositor. (× 3.)

pattern of transverse sulcus; lateral lobes as in male. Tegmina very short, broad, sutural margins decidedly overlapping, distal margin somewhat oblique, arcuato-truncate. Supra-anal plate rotundato-trigonal; cerci



Fig. 49.—*Dichopetala tauriformis* n. sp. Ventral outline of subgenital plate of female (allotype). ($\times 4$.)

short, conic, apices slightly elongate, acute; ovipositor very robust, elongate, about two-thirds as long as the caudal femora, dorsal margin considerably arcuate, more sharply so distad, ventral

margin straight except distad where it is decidedly arcuate, dorsal margin with eight to nine teeth on the distal third, ventral margin with seven to nine teeth on the distal fourth, those on the latter faintly recurved distad; subgenital plate with the chitinous portion completely divided, the lateral sections developed as acute trigonal lobes slightly longer than broad. Cephalic femora very slightly longer than the head and pronotum together. Median femora subequal to the length of the head, pronotum, and tegmina together. Caudal femora subequal to the length of the body, moderately robust (for the genus).

Paratyptic Series.—We consider all of the material before us, other than the type and allotype (three males and seven females), paratyptic.

Measurements (in millimeters).

	Twelve leagues east of San Luis Potosi, Mex.		♂♂ Sierra de San Miguelito, Mex. (Paratypes.)		Average of three paratypes.
	(TYPE.)	(Paratype.)			
Length of body.....	16.5	15.2	16.	17.3	16.1
Length of pronotum...	3.9	3.7	4.	3.7	3.8
Greatest caudal width of disk of pronotum.	3.	3.	2.6	2.5	2.7
Length of tegmen.....	3.5	3.5	3.3	3.3	3.3
Greatest width of discoidal and anal fields of tegmen.....	3.2	3.1	2.8	2.6	2.8
Length of cephalic femur.....	7.9	7.3	7.	7.6	7.3
Length of median femur.....	9.9	9.5	8.7	9.	9.1
Length of caudal femur.....	19.7	18.5	17.7	19.	18.4

	♀ ♀ Twelve leagues east of San Luis Potosi, Mex.		
	(Allotype.)	(Paratypes.)	
Length of body.....	17.	19.2	21.5
Length of pronotum.....	4.	4.6	4.7
Greatest caudal width of disk of pronotum.....	3.3	3.7	4.
Length of tegmen.....	1.3	1.5	1.2
Greatest width of tegmen.....	3.	3.2	3.
Length of cephalic femur.....	6.	7.1	8.
Length of median femur.....	7.4	8.6	9.5
Length of caudal femur.....	17.	18.2	20.6
Length of ovipositor.....	10.8	12.	12.8

	Alvarez, Mex. (Paratype.)	♀ ♀ Sierra de San Miguelito, Mex. (Paratypes.)		Average of five paratypes.
		15.5	16.8	
Length of body.....	20.4	15.5	16.8	18.7
Length of pronotum.....	4.5	4.3	4.4	4.5
Greatest caudal width of disk of pronotum.....	3.5	3.3	3.4	3.6
Length of tegmen.....	1.5	1.7	1.2	1.4
Greatest width of tegmen.....	3.	2.6	2.9	2.9
Length of cephalic femur.....	7.1	7.3	7.5	7.4
Length of median femur.....	8.2	8.4	—	8.6
Length of caudal femur.....	17.2	19.2	18.5	18.7
Length of ovipositor.....	12.3	11.	11.3	11.8

Color Notes.—This species has the usual intensive and recessive extremes, the former of which has a dorsal color much darker than the lateral one, in the recessive extreme there being almost no difference in tone between the lateral and dorsal colors. As far as present material goes, the extremes are almost equally marked in the two sexes and the tones are very similar in both. We here give the colors as found in the material, but as none of it has been stuffed there is a strong probability that the greens, at least, have lost much of their intensity. Dorsal color varying from sulphine yellow (extreme in the females alone) to dull maroon (intensive of both sexes), traces of the latter being present in the recessive males,²⁹ while this color is solid and pure on the head and disk of the pronotum of intensive individuals of both sexes. On the dorsum of the abdomen

²⁹ Possibly the recessive condition in the male is wholly due to desiccation, the original dorsal color being left in patches. We, however, do not feel convinced that this is the case, as the general tonal correlation of what we consider the recessive male is essentially the same as in the undoubtedly recessive females.

this intensive color is only pure laterad, mesad the tone being aniline yellow to sulphine yellow, thickly and closely stippled with maroon. The lateral maroon bordering lines are narrowly present in even the recessive males as well as faintly indicated in the recessive females. Lateral color varying from sulphine yellow to buffy citrine, the males being almost all sulphine yellow, particularly pure in the intensive males. Pale lateral lines very narrow, more or less indicated in all, varying from creamy white to maize yellow, rarely touched with orange pink, extending from the caudal margin of the eye to the base of the cercus. Eyes varying from chamois (recessive male) and buffy citrine (recessive female) to old gold (intensive male) and cinnamon brown (intensive female). Antennæ varying much the same as the dorsal color. Tegmina of male largely oil green, the proximal portion of the humeral trunk blackish, large portion of anal field washed with warm sepia, marginal field shell pink; temina of female with discoidal field oil green, anal field similar, occasionally (intensive female [allotype]) washed with maroon, marginal field shell pink to ochre red. Ovipositor varying with the dorsal color. Limbs varying from pois green to grape green, occasionally washed with purplish vinaceous on median and cephalic pair in recessive specimens, of the same greatly suffused, lined and spotted with maroon in intensive individuals. The latter condition is very decided in its extreme, the femora having nearly solid pregenicular patches dorsad, while the distal extremities of the tibiæ and all of the tarsi are suffused with maroon. The type and allotype are in the extreme intensive condition, which is shared or approximated by several other specimens.

Distribution.—The present species is known only from three localities in the state of San Luis Potosi in the east-central portion of the Mexican tableland: Sierra de San Miguelito, mountains twelve leagues east of San Luis Potosi city, and mountains at Alvarez. The first-mentioned locality we are unable to locate, so its altitude cannot be given, but it probably has much the same elevation as the other localities, which range between five and six thousand feet. Alvarez is on the upper course of the Rio Verde, a head tributary of the Rio Panuco, east of the city of San Luis Potosi.

Morphological Notes.—The tegmina of the male show variation in the angulation of the sutural margin and in the character of the distal margin. The latter is more arcuate in one specimen than in the type and in one paratypic male it is more truncate. The curve of the stridulating vein also varies somewhat. The stalked process on the male subgenital plate in one paratype is similar to that of

the type, while in the others the head of the process is more or less expanded with the distal margin arcuate. The anomalous cerci seem to vary little or not at all, while the subgenital plate varies only in that the quadrate emargination of the distal margin is replaced by a V-shaped emargination in one paratype. The female shows variation chiefly in the robustness of the ovipositor, although this is not as pronounced as in some other species of the genus.

Remarks.—The structure of the apex of the abdomen in the male of this species and the very heavy ovipositor of the female are characters which serve to easily distinguish the present peculiar form. There is no approach to the genital structure of the male in any of the other forms of the genus, except that the tooth springs from the external margin of the shaft of the cercus in this and in *pollicifera*, which similarity is somewhat augmented by the general form of the pronotum and tegmina, but there the analogy ceases, as the details of the abdominal appendages and of the tegmina are quite different. The female sex, however, shows no close affinity to *pollicifera*, while it does have much in common with *falcata*, to which the male sex shows no affinity.

Specimens Examined.—12; 4 males, 8 females.

Mountains twelve leagues east of San Luis Potosi, Mexico, (Palmer), 2 ♂, 4 ♀. TYPE, allotype, and paratypes. [Scudder Collection.]

Sierra de San Miguelito, state of San Luis Potosi, Mexico, (Palmer), 2 ♂, 3 ♀. Paratypes. [Scudder Collection.]

Mountains at Alvarez, state of San Luis Potosi, Mexico, (Palmer), 1 ♀. Paratype. [Scudder Collection.]

***Dichopetala tridactyla* n. sp.**

This species can be immediately separated in the male sex from all of the species of the genus, except *D. caudelli*, by the peculiar appendiculate character of the cercus, while from *caudelli* it can be separated in the male sex by the shorter tegmina, the very brief distal portion of the anal-field of the same, by the sutural margin of the tegmina being strongly produced at the apex of the stridulating vein and by the more elongate median tooth of the cercus. In the female sex *tridactyla* can be separated from *caudelli* by the shorter ovipositor and blunter apices to the lobes of the subgenital plate.

TYPE: ♂; Camacho, Zacatecas, Mexico. November, 1877. (Lawrence Bruner.) [Hebard Collection.]

Description of Type.—Size small. Head with the occiput well

rounded, regularly descending to the fastigium and antennal scrobes; fastigium slightly elevated, compressed, linear, rounded at the apex when seen from the side, not touching the frontal fastigium; eyes very prominent, subglobose, depth about one and one-half times that of the infra-ocular portion of the genæ; antennæ with the proximal joints large, slightly depressed. Pronotum sellate, dorsal length little greater than caudal width of dorsum of same and distinctly less than greatest ventral width of pronotum across lateral lobes; cephalic margin subtruncate, caudal margin very slightly arcuato-emarginate; lateral margins of disk slightly marked caudad by rounded angles, elsewhere by color only, the general form of same considerably narrowed mesad; transverse sulcus severing lateral margins of disk mesad, represented on the disk by a median transverse impression placed at the caudal third, but not connected with the sulci severing the lateral margins of the disk; lateral lobes with greatest depth contained about one and one-half times in the dorsal length of the same, cephalic margin of the lobes arcuato-emarginate,

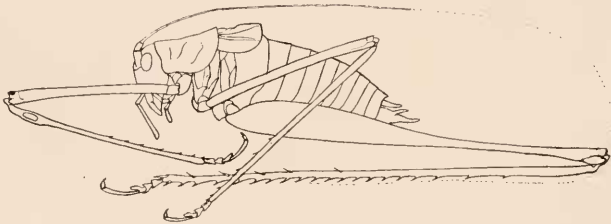
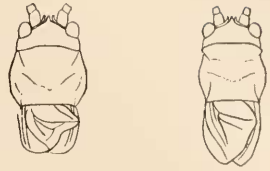


Fig. 50.—*Dichopetala tridaetyla* n. sp. Lateral outline of type (male). ($\times 3$.)

ventro-cephalic angle narrowly rotundato-rectangulate, ventral margin slightly sinuato-truncate, ventro-caudal angle and caudal margin very broadly arcuate. Tegmina slightly shorter than the pronotum, broad, the width of the discoidal and anal fields subequal to the tegminal length; costal margin slightly arcuate, disto-costal angle rounded, distal margin moderately arcuate, passing into the sutural margin, latter strongly rotundato-rectangularly produced at the apex of the stridulating vein, distal portion of the sutural margin strongly oblique; marginal field rather narrow, discoidal field short, strongly expanding distad, anal field very broad. Abdomen with lateral margins of segments subparallel, proximal segments subtectate; disto-dorsal abdominal segment with the distal margin arcuato-truncate, considerably arcuato-emarginate at the dorsal

base of the cerci; cerci trifid, from the dorsal base projects an arcuate subequal blunt digitiform lobe, which in general follows the curve of the shaft of the cercus when seen from the dorsum and when viewed from the lateral aspect is subparallel with the same, not quite reaching the apex of the median tooth, latter diverging proximad of the middle, moderately acute, tapering, slightly depressed, diverging moderately disto-



Figs. 51 and 52.—Dorsal outline of head, pronotum and tegmina of males (types) of *Dichopetala tridactyla* (51) and *D. caudelli* (52). ($\times 3$.)

dorsad, subequal to half the length of the shaft of the cercus distad of the tooth, shaft very robust proximad of the divergence of the tooth, falciform, strongly depressed, triquetrous, margins sharp, apex acute, tapering for a short distance proximad of apex; subgenital plate large, cymbiform, moderately produced, distal margin broadly and rather deeply V-emarginate, lateral angles moderately acute. Cephalic femora slightly less than half the length of the caudal femora; cephalic tibiae with tympanum



Figs. 53 and 54. Outline of left cercus of males (types) of *Dichopetala tridactyla* (53) and *D. caudelli* (54). ($\times 8$.)

elliptical. Median femora subequal to one-half the length of the caudal femora. Caudal femora about one and one-half times the length of the body, moderately inflated proximad.

Allotype: ♀; data the same as the type.

Description of Allotype.—Size medium; form robust (for the genus). Head broad, form of occiput and fastigium as in the male, the latter, however, not as compressed; eyes prominent, more ovate than in the male, depth of eye contained about one and one-half times in that of the infra-ocular portion of the genæ. Pronotum in general form similar to that of the male, but less sellate, non-depressed mesad; caudal margin of disk subtruncate; lateral margins of disk hardly indicated even caudad; transverse sulcus as in male, the median discal remnant of same less distinct and V-shaped; lateral lobes with greatest depth contained



Figs. 55 and 56.—Ventral outline of subgenital plate of males (types) of *Dichopetala tridactyla* (55) and *D. caudelli* (56). ($\times 8$.)

nearly one and one-half times in greatest dorsal length of same, margins of lobes as in male, but the cephalic truncate and not emarginate. Tegmina very short,

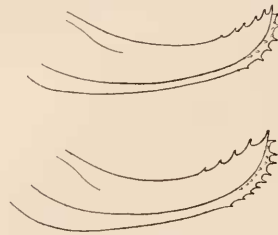


Figs. 57 and 58.—Ventral outline of subgenital plate of females (allotypes) of *Dichopetala tridactyla* (57) and *D. caudelli* (58). (× 5.)

over twice as wide as the apparent length, costal margin arcuate with the distal portion more or less truncate; interspace between tegmina slightly more than half the width of a single tegmen. Abdomen somewhat compressed, proximal

segments tectate dorsad; supra-anal plate moderately produced, rounded; cerci very short, conic; ovipositor slightly surpassing the length of the median femora, moderately arcuate, more sharply

so distad, robust, dorsal margin faintly flattened mesad, distal third of same margin armed with six distinct teeth, increasing in length distad, ventral margin very weakly arcuate except in the distal third where the arcuation is decided, there armed with six to seven short slightly recurved teeth; subgenital plate



Figs. 59 and 60.—Outline of ovipositor of females (allotypes) of *Dichopetala tridactyla* (59) and *D. caudelli* (60). (× 4.)

divided into two parts, as far as the chitinous structure is concerned, these connected mesad for a third of their length by soft integument, the lateral halves of the plate subovoid-trigonal, the apices bluntly angulate: Cephalic femora about one and two-thirds times the length of the disk of the pronotum. Median femora slightly less than half the length of the caudal femora. Caudal femora robust (for the genus), considerably inflated.

Paratypic Series.—All of the material belonging to this species now before us, in addition to the type and allotype, is considered paratypic—four males, fifteen females.

Measurements (in millimeters).

	Camacho, Mexico.	
	(TYPE)	Average of four paratypic
	♂	♂♂
Length of body.....	10.8	11.3 (11.2-11.7)
Length of pronotum.....	2.8	3. (2.9-3.1)
Greatest dorsal width of pronotum.....	2.1	2.5 (2.5-2.6)

Camacho, Mexico.

	(TYPE) ♂	Average of four paratype ♂♂
Length of tegmen.....	2.6	2.6 (2.5- 2.6)
Greatest width of discoidal and anal fields of tegmen.....	2.3	2.6 (2.4- 2.7)
Length of cephalic femur.....	7.	7.1 (7. - 7.5)
Length of median femur.....	7.5	8. (7.4- 8.4)
Length of caudal femur.....	15.	16.3 (15.2-17.1)

Camacho, Mexico.

	(Allotype) ♀	Average of four paratype ♀♀
Length of body (exclusive of ovipositor)	15.5	15.3 (14.7-17.)
Length of pronotum.....	4.3	3.8 (3.4- 4.)
Greatest dorsal width of pronotum.....	3.7	3.1 (2.9- 3.2)
Apparent length of tegmen.....	.9	1. (.9- 1.1)
Greatest width of tegmen.....	2.1	1.9 (1.8- 2.)
Length of cephalic femur.....	7.1	6.7 (6.5- 7.)
Length of median femur.....	8.2	7.6 (7.1- 8.3)
Length of caudal femur.....	18.2	17.1 (16.3-18.3)
Length of ovipositor.....	8.3	8.1 (7.8- 8.8)

From these measurements it is evident that the type is distinctly under the average in size, while the allotype is considerably over the average for the female sex, both showing in certain proportions the minimum and maximum proportions, respectively, for their sexes. The selection of the type and allotype was based solely on the condition of the specimens, so no size factors were considered in the matter. It is apparent from the above evidence that there is considerable individual variation in size in the species.

Color Notes.—As none of the material belonging to this species has been stuffed, we are compelled to take the colors found at their face value, although doubtless some have altered very materially. The pattern of both sexes consists of a more or less uniform dorsal color involving a variable portion of the occiput, dorsum of the pronotum, dorsal portion of the lateral lobes of the pronotum and dorsum of the abdomen, and a pale lateral color which involves the face, genæ, ventral portion of the lateral lobes, and lateral aspect of the abdomen, the latter color always (♂) or frequently (♀) modified in extent and tint.

Male. Dorsal color varying from prout's brown to clove brown, most decided near its lateral borders on the abdomen. Lateral color varying from buckthorn brown to dresden brown, the ventral half

of the lateral lobes of the abdomen and the marginal field of the tegmina creamy white in intensive specimens; paired lateral lines on the abdomen (in the usual position of pale lines in the genus) contrasted with a wash of the dorsal color on the proximo-ventral portion of the abdomen. Head with narrow postocular lines and a medio-longitudinal thread on the occiput and fastigium creamy white, in intensive individuals the dorsal color covering much of the postocular portion of the genæ; eyes varying from dresden brown to cinnamon brown; antennæ ferruginous dorsad, ventral surface mahogany red to chestnut. Pronotum with the caudal section of the disk washed with auburn, continuations of the postocular lines, converging to the transverse sulcus and diverging caudad of the same, subobsolete near the caudal margin, varying from creamy white to buff yellow; dorsal color more or less strongly clouding an obliquely delimited dorsal section of the lateral lobes, ventral section of same creamy white. Tegmina with the discoidal and anal fields with a blackish-brown base, over which the veins are outlined in ochraceous orange, the greater portion of the sutural margin washed with hay's russet. Distal half of the appendiculate lobe of the cerci infusate with the dorsal color in intensive individuals. Limbs varying from old gold to olive lake, more or less generally infusate with chestnut brown, most decided ventrad and there linear in pattern; caudal femora with a pair of fine blackish lines on the ventral portion of the lateral face; tibiæ more or less lime green.

Female. Dorsal color ranging from argus brown to dark mummy brown; lateral color ranging from creamy white to dresden brown, the latter in recessive individuals and there very poorly separated from the dorsal shade. Head with pale lines less distinctly indicated than in the male sex, the extreme intensive individual having the greater portion of the head opaline green. In the average individuals the abdomen has no decidedly indicated lateral bars dorsad margining the dorsal color, but in the intensive specimens these bars are decided creamy white, of variable width and the lateral base of the abdomen is contrastingly washed with the dorsal color. Pronotum as in the male, but nearly uniform in recessive individuals. Tegmina varying from nearly uniform with the lateral color to blackish brown, with the venation of the lateral color, in the intensive extreme having the costal portion of the latter color. Ovipositor varying from citrine to orange-citrine, distal portion infusate in some specimens. Limbs varying from viridine green (in this the femora pale bluish white proximad) to cosse green, marked much as in the male, but with the

infuscation more or less tessellate or marmorate, linear and punctate in character.

Distribution.—The present species is only known from two localities in the central portion of the Mexican tableland—Camacho, Zacatecas, and Jimulco, Coahuila. Its vertical distribution is apparently from somewhat below five thousand to about six thousand feet.

Morphological Notes.—In the male sex the only morphological variation worth noting is that of the degree of arcuation of the margins of the distal excision of the subgenital plate. In the type these margins are straighter than in the others of the sex, but in all they are more or less arcuate toward the angles. In the female sex the ovipositor varies appreciably in robustness without correlation with the general size.

Remarks.—The present species and *D. caudelli* constitute a very distinct section of the genus, having no close relationship to any of the other forms.

Specimens Examined.—21; 5 males, 16 females.

Camacho, Zacatecas, Mexico, November, 1887, (Lawrence Bruner), 5 ♂, 14 ♀. TYPE, allotype, and paratypes. [Hebard Collection.]

Jimulco, Coahuila, Mexico, November, (Lawrence Bruner), 2 ♀. Paratypes. [Hebard Collection.]

Dichopetala caudelli n. sp.

This species is close to *D. tridactyla*, but can be readily separated in the male sex by the distinctly longer tegmina, the more normal distal portion of the anal field of the same, the sutural margin of which is but little produced at the apex of the stridulating vein and by the shorter median tooth of the cercus, while in the female the slightly longer ovipositor and acute apices to the lobes of the subgenital plate enable one to distinguish the present form. The species is similar to *tridactyla* in the majority of the characters, so we have made our description in large part comparative. When not mentioned specifically, the structure is understood to be similar to that in *tridactyla*.

TYPE: ♂; San Luis Potosi, state of San Luis Potosi, Mexico. (Palmer.) [Scudder Collection.]

Description of Type.—Size and form as in *tridactyla*. Head as in *tridactyla*. Pronotum with the caudal margin of the disk very slightly arcuate, disk itself (indicated by color) broader mesad than in *tridactyla*, the lateral borders of the same less sharply diverging cephalad and caudad; transverse sulcus severing the lateral borders of the

disk mesad, forming a V-shaped figure near the caudal third of the disk; caudal margin of the lateral lobes of the pronotum obliquely subtruncate, ventro-caudal angles of lobes rounded. Tegmina appreciably longer than the dorsum of the pronotum, width of discoidal and anal fields slightly less than the length of same; costal margin considerably arcuate, distal margin obliquely arcuato-truncate, sutural margin obtuse-angulate at the extremity of the stridulating vein, appreciably sinuate distad of the same; discoidal field less sharply expanded than in *tridactyla*. Cerci with the appendicular lobe straighter than in *tridactyla*, slightly expanded distad, median tooth short, depressed, when seen from the dorsum with the margin rounded and not acute, acute distal extremity of the shaft of the cercus slightly shorter and more regularly tapering than in *tridactyla*;

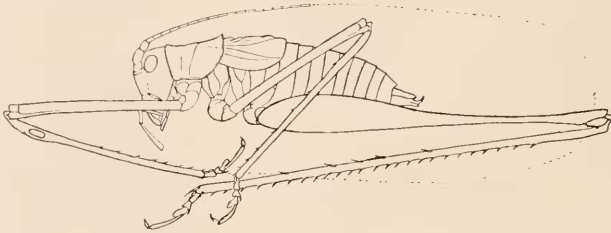


Fig. 61.—*Dichopetala caudelli* n. sp. Lateral outline of type (male). ($\times 3$.)

subgenital plate with distal margin more deeply V-emarginate than in *tridactyla*, the margins of the excision slightly arcuate, the lateral angles quite acute. Limbs as in *tridactyla*, but cephalic and median femora very slightly slenderer.

Allotype: ♀; Mountains twelve leagues east of San Luis Potosi, state of San Luis Potosi, Mexico. (Palmer.) [Scudder Collection.]

Description of Allotype.—Differing from the allotype of *tridactyla* in the characters here described. Form and size as in *tridactyla*. Head as in *tridactyla*. Pronotum as in *tridactyla*, but with the disk broader mesad, the margins (indicated almost wholly by color) very slightly narrowing to the transverse sulcus, thence moderately diverging caudad; caudal margin of disk gently arcuate; transverse sulcus more continuous than in *tridactyla*, but weak mesad; lateral lobes of the pronotum shallower than in *tridactyla*, the greatest depth contained nearly twice in the greatest dorsal length of the same, margins similar. Tegmina similar to those of *tridactyla*. Abdomen very similar to that of *tridactyla*; ovipositor slightly more robust

	Alvarez, Mex. (Paratypes.)		♀ ♀	Average of four para- types.
Greatest caudal width of pro- notum.....	3.4	3.4	3.2	3.2
Length of tegmen.....	1.	1.	1.1	1.
Greatest width of tegmen.....	1.8	1.8	2.	1.9
Length of cephalic femur.....	7.4	7.6	7.4	7.4
Length of median femur.....	8.5	9.	8.9	8.7
Length of caudal femur.....	18.5	18.8	18.1	18.6
Length of ovipositor.....	9.	9.2	9.	8.9

Color Notes.—In recessive individuals this species is unicolorous, while in intensive individuals the dorsal color is distinctly darker than the lateral, and pale paired bars are more or less decidedly indicated in all but the extreme recessive specimens. The extreme recessive condition is represented by one female, closely approached by another of the same sex and less closely by a male. The extreme intensive condition is represented by one male and one female and approached by three other females. The type is nearly intermediate between the extremes, but slightly nearer the intensive condition; the allotype approaches the intensive condition, but is not typical of it. The extreme recessive condition (♀) is uniform light brownish olive except for the tegmina. The extreme intensive condition in the male has the dorsal color maroon along the lateral margins of the area on the head, disk of pronotum, and abdomen, paling to cedar green and weak buff yellow (on abdomen only) mesad, while in the female the general tone of the dorsum is tawny, washed with claret brown caudad on each abdominal segment and margined laterad by the same. The suffusing color of the dorsum is largely produced by stippling and the extreme margins of the pronotum and abdominal segments are of the color of the pale lateral lines beaded with the suffusing tone. The dorsal color of the male ranges through old gold with weakly indicated blackish lateral margins, of the female through kildare green finely sprinkled with maroon. Pale lateral lines varying from chalk white to weak orange pink (in part only and in the intensive male), narrow in the female and broad in the male, cover the entire marginal field of the tegmina in both sexes. In the male these lines are crenulate on the abdomen, while in the female they are more or less obliquely offset on each segment. Lateral color of male varying from yellowish olive green (intensive extreme) to chamois (recessive extreme), in the female from the recessive extreme with it uniform with the dorsum to the intensive extreme

which has it sayal brown, the segments of the abdomen stippled and beaded as on the dorsum, the lateral lobes of the pronotum touched with mignonette green in this type. Head with the eyes varying from cinnamon buff to snuff brown. Pronotum with the lateral lobes edged with the color of the pale bars in all but the recessive females, in one of the intensive females there being a considerable area of chalky white on the ventral portion of the lobes. Tegmina of male with the humeral trunk claret brown to bay, discoidal field varying from yellowish olive green to cosse green, anal field sharing the same tone. but more or less oil green mesad with the proximal portion more or less mahogany red. Tegmina of the female divided between the dorsal and lateral color with the region of the humeral trunk claret brown to bay. Limbs almost wholly of the lateral color, occasionally more greenish in tone, in intensive individuals more or less washed, lined and stippled (particularly on cephalic and median pair) with claret brown. Dorsal aspect of the cerci of male washed with claret brown. Ovipositor with teeth blackish.

Distribution.—This species, as far as known, has a limited range in the east-central portion of the Mexican tableland, occurring at three localities in the state of San Luis Potosi: San Luis Potosi City and hills near the same, mountains twelve leagues east of San Luis Potosi and mountains at Alvarez. The latter locality is south of the upper course of the Rio Verde, a tributary of the Rio Panuco which empties into the Gulf of Mexico near Tampico. As far as we are able to determine from several topographic maps, the localities are situated between five thousand and six thousand two hundred feet elevation.

Morphological Notes.—In the female sex there is some little variation in the shape of the caudal margin of the disk of the pronotum, this ranging from gently arcuate to sinuato-truncate. The interspace between the tegmina also varies considerably in width in the same sex, in the greatest extreme being subequal in width to a single tegmen. The ovipositor varies slightly but appreciably in depth and in the number of teeth on the dorsal margin (6 to 8).

Remarks.—We take pleasure in dedicating this species to Mr. A. N. Caudell, of the United States National Museum, who called our attention to the peculiar cerci of the male sex.

Specimens Examined.—12; 4 males, 8 females.

San Luis Potosi, Mexico, (Palmer), 3 ♂, TYPE and paratypes, 1 ♀. [Scudder Collection and U. S. N. M.]

Hills near San Luis Potosi, Mexico, October 15, (Palmer), 2 ♀. Paratypes. [Scudder Collection.]

Mountains twelve leagues east of San Luis Potosi, Mexico, (Palmer), 1 ♀. Allotype. [Scudder Collection.]

Mountains at Alvarez, San Luis Potosi, Mexico, (Palmer), 1 ♂, 4 ♀. Paratypes. [Scudder Collection and U. S. N. M.]